

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO. (If known see 37 C.F.R. 1.5)

INTERNATIONAL APPLICATION NO

INTERNATIONAL FILING DATE

(EARLIEST) PRIORITY DATE CLAIMED

PCT/JP00/01560

MARCH 15, 2000

MARCH 19, 1999

TITLE OF INVENTION

**TRANSMITTING APPARATUS, RECEIVING APPARATUS,  
TRANSMITTING AND RECEIVING APPARATUS, TRANSMITTING  
METHOD, RECEIVING METHOD, AND TRANSMITTING AND  
RECEIVING METHOD**

APPLICANT(S) FOR DO/EO/US **Fumihiko NISHIO, Yoshihisa GONNO, Kazuo HARAOKA, Yasuaki  
YAMAGISHI and Kazuhiko TAKABAYASHI.**

Applicants herewith submit to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
- ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
- ☒ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
- ☐ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
- ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
- ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
- ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ A English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 16 below concern document(s) or information included:**

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
- ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter
16. ☐ Other items or information:

PCT/RO/101

PCT/ISA/ 210

19 Sheets of Drawings, 1 Page Abstract

**EXPRESS MAIL**

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U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.50)

INTERNATIONAL APPLICATION NO.

ATTORNEY'S DOCKET NO.

09/700610

PCT/JP00/01560

450106-02405

17. ☒ The following fees are submitted

(CALCULATIONS /PTO USE ONLY)

**Basic National Fee (37 CFR 1.492(a)(1)-(5)):**

Neither international preliminary examination fee (37 CFR 1.482)  
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO  
and International Search Report not prepared by the EPO or JPO... \$1,000.00

International preliminary examination fee (37 C.F.R. 1.482) not paid to  
USPTO but International Search Report prepared by the EPO or JPO... \$ 860.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but  
international search fee (37 CFR 1.445(a)(2)) paid to USPTO... \$ 710.00

International preliminary examination fee paid to USPTO (37 CFR 1.482)  
but all claims did not satisfy provisions of PCT Article 33(1)-(4)... \$ 690.00

International preliminary examination fee paid to USPTO (37 CFR 1.482)  
and all claims satisfied provisions of PCT Article 33(1)-(4)... \$ 100.00

**ENTER APPROPRIATE BASIC FEE AMOUNT = (\$ 860.00)**

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)). (\$

24 Claims /Number Filed / Number Extra /Rate (\$

Total Claims / 24 - 20 = / 4 /X \$18.00 (\$ 72.00

Independent Claims / 15 - 3 = / 12 /X \$80.00 (\$ 960.00

MULTIPLE DEPENDENT CLAIM(S) (if applicable) /+ \$270.00 (\$

**TOTAL OF ABOVE CALCULATIONS = (\$1,892.00)**

☐ Applicant claims small entity status. See 37 C.F.R. 1.27. The fees indicated above are reduced by 1/2. (\$

**SUBTOTAL = (\$1,892.00)**

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). + (\$

**TOTAL NATIONAL FEE = (\$1,892.00)**

Fee for recording the enclosed assignments (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property + (\$

**TOTAL FEES ENCLOSED = (\$1,892.00)**

(Amount to be: \$  
refunded:

(charged: \$

a. ☒ A check in the amount of \$1,892.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$\_\_\_\_\_ to cover the above fees.

A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **50-0320**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

**WILLIAM S. FROMMER**  
**FROMMER LAWRENCE & HAUG LLP**  
**745 FIFTH AVENUE**  
**NEW YORK, NEW YORK 10151**

Dated: November 17, 2000

SIGNATURE

William S. Frommer  
NAME

25.506  
REGISTRATION NUMBER

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

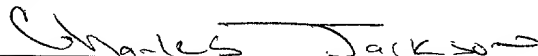
Applicant(s) : NISHIO ET AL.  
Int'l Appln. No. : PCT/JP00/01560  
Int'l Filing Date : March 15, 2000  
Title of Invention : TRANSMITTING APPARATUS, RECEIVING  
APPARATUS, TRANSMITTING AND  
RECEIVING APPARATUS, TRANSMITTING  
METHOD, RECEIVING METHOD, AND  
TRANSMITTING AND RECEIVING METHOD

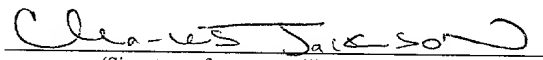
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**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Box PCT  
Washington, D.C. 20231

Dear Sir:

Prior to the issuance of the first Office Action, please amend the above-identified application as follows:

**IN THE CLAIMS:**

Claim 4, line 2, please delete “2, or 3,”;

Claim 5, line 2, please delete “or 3”;

Claim 16, line 2, please delete “or 15”;

Add new claims 21-24 as follows:

--21. The transmitting apparatus as set forth in claim 2, further comprising:

converting means for converting the format of the meta information into a transmission format.

22. The transmitting apparatus as set forth in claim 3, further comprising:

converting means for converting the format of the meta information into a transmission format.

23. The transmitting apparatus as set forth in claim 3,

wherein data that has been received through said communication controlling apparatus is data that represents a use history of meta information of the receiving apparatus.

24. The transmitting method as set forth in claim 15, further comprising the step of:

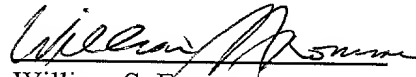
receiving a meta information use history from the receiving apparatus and transmitting a meta information schema, meta information, and an inference rule that have been changed so that they have respective data structures corresponding to the meta information use history.--

**REMARKS**

Claims 4, 5, and 16 have been amended to correct the dependency thereof. Claims 21-24 have been added.

An early examination on the merits of this application is respectfully solicited.

Respectfully submitted,  
FROMMER LAWRENCE & HAUG LLP

By:   
William S. Frommer  
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## DESCRIPTION

Transmitting Apparatus, Receiving Apparatus,  
Transmitting and Receiving Apparatus, Transmitting  
Method, Receiving Method, and Transmitting and  
5 Receiving Method  
Technical Field

The present invention relates to a  
transmitting apparatus, a receiving apparatus, a  
transmitting and receiving apparatus, a transmitting  
10 method, a receiving method, and a transmitting and  
receiving method that are used in the field of a  
technology for delivering video and audio data to an  
infinite number of subscribers and that allow delivered  
data to be effectively accessed.

## 15 Related Art

Many techniques have been proposed as data  
delivering systems. For example, on the Internet, data  
is delivered using WWW (World Wide Web) corresponding  
to HTTP (Hyper Text Transfer Protocol). To retrieve  
20 desired data from a huge amount of a data collection of  
WWW (World Wide Web), the use of meta information is  
becoming common. The meta information represents  
information about each title of data. As an example of  
systems that selectively receive data corresponding to  
25 meta information from WWW, PICS (Platform for Internet  
Content Selection) and RDF (Resource Description  
Framework) have been proposed.

In a digital broadcast, meta information such as a program title and broadcast time data that are structural elements of EPG (Electronic Program Guide) is transmitted in the format of EIT (Event Information Table). Information of EPG is represented as a section type table or the like referred to as SI (Service Information). A receiving apparatus extracts relevant information from the table and displays the extracted information on its screen. With EPG, the user can select data as a program from successive broadcast data.

Although a digital broadcast is unidirectionally transmitted to a very large number of terminal apparatuses, a large amount of data can be simultaneously transmitted. Thus, it is advantageous to merge a digital broadcast and a network. In reality, meta information is added to contents data on the Internet or contents data of a digital broadcast. Since a receiving apparatus should effectively access contents data using such meta information, the receiving apparatus should effectively search required meta information. In addition, when meta information is added to contents data, the amount of transmission data increases. Thus, it is necessary to effectively add and transmit meta information.

Disclosure of the Invention

Therefore, an object of the present invention

is to provide a transmitting apparatus, a receiving apparatus, a transmitting and receiving apparatus, a transmitting method, a receiving method, and a transmitting and receiving method that allow the transmission efficiency of meta information of the transmitting apparatus or the searching efficiency of the receiving apparatus to be improved without an increase of the data amount of the meta information.

To accomplish the above-described problem, the invention of claim 1 is a transmitting apparatus for providing digital contents, comprising a meta information storing means for storing meta information about data that is transmitted, a meta information schema storing means for storing a meta information schema that defines the data structure of meta information about data that is transmitted, an inference rule storing means for storing an inference rule about the data structure of meta information about data that is transmitted, and a transmitting means for transmitting the meta information, the meta information schema, the inference rule, and contents data through a transmission path.

According to the invention of claim 1, since an inference rule is transmitted, the data amount of meta information to be transmitted can be reduced.

The invention of claim 2 is a transmitting apparatus for providing digital contents, comprising a



meta information storing means for storing meta  
information about data that is transmitted, a meta  
information schema storing means for storing a meta  
information schema that defines the data structure of  
5 meta information about data that is transmitted, a  
transmitting means for transmitting the meta  
information, the meta information schema, and contents  
data through a transmission path, a communication  
controlling means for communicating with a receiving  
10 apparatus, and a changing means for changing the  
structure of the meta information schema that has been  
stored in the meta information schema storing means and  
the meta information that has been stored in the meta  
information storing means corresponding to data that  
15 has been received through the communication controlling  
means.

According to the invention of claim 2, the  
transmitting apparatus is informed of a meta  
information use history, for example, the applied  
20 frequency of a meta information schema on the receiving  
side. Thus, a meta information schema transmitted from  
the transmitting apparatus is changed. In other words,  
an attribute whose applied frequency is low is deleted  
the transmission thereof becomes unnecessary. Thus,  
25 the data amount of a meta information schema to be  
transmitted can be reduced.

The invention of claim 3 is a transmitting

apparatus for providing digital contents, comprising a  
meta information storing means for storing meta  
information about data that is transmitted, a meta  
information schema storing means for storing a meta  
information schema that defines the data structure of  
5 meta information about data that is transmitted, an  
inference rule storing means for storing an inference  
rule about the data structure of meta information about  
data that is transmitted, a transmitting means for  
10 transmitting the meta information, the inference rule,  
and contents data through a transmission path, a  
communication controlling means for communicating with  
a receiving apparatus, and a changing means for  
changing the inference rule that has been stored in the  
15 inference rule storing means corresponding to data that  
has been received through the communication controlling  
means.

According to the invention of claim 3, the  
transmitting apparatus is informed of a meta  
20 information use history, for example, the applied  
frequency of an inference rule on the receiving side.  
Thus, an inference rule transmitted from the  
transmitting apparatus is changed. In other words, an  
inference rule whose applied frequency is low is  
25 deleted or the transmission thereof becomes  
unnecessary. Thus, the data amount of an inference  
rule to be transmitted can be reduced.

The invention of claim 6 is a receiving apparatus for receiving data for providing digital contents, comprising a receiving means for receiving at least meta information and contents data through a transmission path, a meta information schema storing means for storing a meta information schema, a profile operating means for operating a selection criterion for selecting meta information corresponding to the meta information schema, a user profile storing means for storing a user profile generated by the profile operating means, a meta information filtering means for selecting and receiving meta information corresponding to the user profile, a meta information storing means for storing meta information that has been selected and received, a meta information operating means for searching and/or browsing meta information, an inference rule storing means for storing an inference rule about the data structure of meta information, a data storing means for receiving and storing data of contents represented by the meta information that has been selected, and a data operating portion for operating data that has been stored in the data storing means.

According to the invention of claim 6, with an inference rule, the data amount of meta information to be transmitted can be reduced.

The invention of claim 7 is a receiving

apparatus for receiving data for providing digital contents data, comprising a receiving means for receiving at least meta information and contents data through a transmission path, a meta information schema storing means for storing a meta information schema that defines the data structure of meta information, a profile operating means for operating a selection criterion for selecting meta information corresponding to the meta information schema, a user profile storing means for storing a user profile generated by the profile operating means, a meta information filtering means for selecting and receiving meta information corresponding to the user profile, a meta information storing means for storing meta information that has been selected and received, a meta information operating means for searching and/or browsing meta information, an inference rule storing means for storing an inference rule about the data structure of meta information, a changing means for changing the structure of the meta information schema that has been stored in the meta information schema storing means and the meta information that has been stored in the meta information storing means corresponding to the user profile that has been stored in the user profile storing means and to the inference rule that has been stored in the inference rule storing means, a data storing means for receiving and storing data of

contents represented by the selected meta information,  
and a data operating portion for operating data that  
has been stored in the data storing means.

According to the invention of claim 7, an  
5 inference rule is used. In addition, when the use  
frequency of an inference rule becomes high or  
corresponding to a user's setup, the structure of a  
meta information schema and meta information are  
changed so that a new attribute is defined  
10 corresponding to the inference rule. Thus, the  
searching efficiency can be improved.

The invention of claim 10 is a transmitting  
and receiving apparatus having a transmitting apparatus  
for providing digital contents and a receiving  
15 apparatus for receiving digital contents, wherein the  
transmitting apparatus comprises a meta information  
storing means for storing meta information about data  
that is transmitted, a meta information schema storing  
means for storing a meta information schema that  
20 defines the data structure of meta information about  
data that is transmitted, an inference rule storing  
means for storing an inference rule about the data  
structure of meta information about data that is  
transmitted, and a transmitting means for transmitting  
25 the meta information, the meta information schema, the  
inference rule, and contents data through a  
transmission path, and wherein the receiving apparatus

comprises a receiving means for receiving the meta  
information, the meta information schema, the inference  
rule, and contents data through a transmission path, a  
meta information schema storing means for storing the  
received meta information schema, a profile operating  
means for operating a selection criterion for selecting  
meta information corresponding to the meta information  
schema, a user profile storing means for storing a user  
profile generated by the profile operating means, a  
meta information filtering means for selecting and  
receiving meta information corresponding to the user  
profile, a meta information storing means for storing  
the meta information that has been selected and  
received, a meta information operating means for  
searching and/or browsing meta information, an  
inference rule storing means for storing an inference  
rule that has been received, a data storing means for  
receiving and storing data of contents that is  
represented by the selected meta information, and a  
data operating portion for operating data that has been  
stored in the data storing means.

According to the invention of claim 10, with  
an inference rule, the data amount of meta information  
to be transmitted can be reduced.

The invention of claim 11 is a transmitting  
and receiving apparatus having a transmitting apparatus  
for providing digital contents and a receiving

apparatus for receiving digital contents, wherein the transmitting apparatus comprises a meta information storing means for storing meta information about data that is transmitted, a meta information schema storing means for storing a meta information schema that defines the data structure of meta information about data that is transmitted, a transmitting means for transmitting the meta information, the meta information schema, and contents data through a transmission path, a communication controlling means for communicating with the receiving apparatus, and a changing means for changing the structure of the meta information schema that has been stored in the meta information storing means and the meta information that has been stored in the meta information storing means corresponding to data that has been received through the communication controlling means, and wherein the receiving apparatus comprises a receiving means for receiving the meta information, the meta information schema, and contents data through a transmission path, a meta information schema storing means for storing the meta information schema that has been received, a profile operating means for operating a selection criterion for selecting meta information corresponding to the meta information schema, a user profile storing means for storing a user profile generated by the profile operating means, a meta information filtering means for selecting and

receiving meta information corresponding to the user  
profile, a meta information storing means for storing  
meta information that has been selected and received, a  
meta information operating means for searching and/or  
5 browsing meta information, a data storing means for  
receiving and storing data of contents represented by  
the meta information that has been selected, a data  
operating portion for operating data that has been  
stored in the data storing means, and a communication  
10 controlling means for transmitting data to the  
transmitting apparatus.

According to the invention of claim 11, the  
transmitting apparatus is informed of a meta  
information use history, for example, the applied  
15 frequency of a meta information schema on the receiving  
side. Thus, a meta information schema transmitted from  
the transmitting apparatus is changed. In other words,  
an attribute whose applied frequency is low is deleted  
or the transmission thereof becomes unnecessary. Thus,  
20 the data amount of a meta information schema to be  
transmitted can be reduced.

The invention of claim 12 is a transmitting  
and receiving apparatus having a transmitting apparatus  
for providing digital contents and a receiving  
25 apparatus for receiving digital contents, wherein the  
transmitting apparatus comprises a meta information  
storing means for storing meta information about data



that is transmitted, a meta information storing means  
for storing a meta information schema that defines the  
data structure of meta information about data that is  
transmitted, an inference rule storing means for  
5 storing an inference rule about the data structure of  
meta information about data that is transmitted, a  
transmitting means for transmitting the meta  
information, the meta information schema, the inference  
rule, and contents data through a transmission path, a  
10 communication controlling means for communicating with  
the receiving apparatus, and a changing means for  
changing the inference rule that has been stored in the  
inference rule storing means corresponding to data that  
has been received through the communication controlling  
15 means, and wherein the receiving apparatus comprises a  
receiving means for receiving the meta information, the  
meta information schema, the inference rule, and  
contents data through a transmission path, a meta  
information schema storing means for storing the meta  
20 information schema that has been received, a profile  
operating means for operating a selection criterion for  
selecting meta information corresponding to the meta  
information schema, a user profile storing means for  
storing a user profile generated by the profile  
25 operating means, a meta information filtering means for  
selecting and receiving meta information corresponding  
to the user profile, a meta information storing means

for storing the meta information that has been selected and received, a meta information operating means for searching and/or browsing meta information, an inference rule storing means for storing the inference rule that has been received, a data storing means for receiving and storing data of contents represented by the meta information that has been selected, a data operating portion for operating data that has been stored in the data storing means, and a communication controlling means for transmitting data to the transmitting apparatus.

According to the invention of claim 12, the transmitting apparatus is informed of a meta information use history, for example, the applied frequency of an inference rule on the receiving side. Thus, an inference rule transmitted from the transmitting apparatus is changed. In other words, an inference rule whose applied frequency is low is deleted or the transmission thereof becomes unnecessary. Thus, the data amount of an inference rule to be transmitted can be reduced.

The invention of claim 13 is a transmitting and receiving apparatus having a transmitting apparatus for providing digital contents and a receiving apparatus for receiving digital contents, wherein the transmitting apparatus comprises a meta information storing means for storing meta information about data

that is transmitted, a meta information schema storing means for storing a meta information schema that defines the data structure of meta information about data that is transmitted, an inference rule storing means for storing an inference rule about the data structure of meta information about data that is transmitted, and a transmitting means for transmitting the meta information, the meta information schema, the inference rule, and contents data through a transmission path, and wherein the receiving apparatus comprises a receiving means for receiving the meta information, the meta information schema, the inference rule, and contents data through a transmission path, a meta information schema storing means for storing the meta information schema that has been received, a profile operating means for operating a selection criterion for selecting meta information corresponding to the meta information schema, a user profile storing means for storing a user profile generated by the profile operating means, a meta information filtering means for selecting and receiving meta information corresponding to the user profile, a meta information storing means for storing the meta information that has been selected and received, a meta information operating means for searching and/or browsing meta information, an inference rule storing means for storing an inference rule, a changing means for

changing the structure of the meta information schema  
that has been stored in the meta information schema  
storing means and the meta information that has been  
stored in the meta information storing means  
5 corresponding to the user profile that has been stored  
in the user profile storing means and to the inference  
rule that has been stored in the inference rule storing  
means, a data storing means for receiving and storing  
data of contents represented by the meta information  
10 that has been selected, and a data operating portion  
for operating data stored in the data storing means.

According to the invention of claim 13, an  
inference rule is used. In addition, when the use  
frequency of the inference rule becomes high or  
15 corresponding to a user's setup, the structure of a  
meta information schema and meta information are  
changed so that a new attribute is defined  
corresponding to the inference rule. Thus, the  
searching efficiency can be improved.

20 The invention of claim 14 is a transmitting  
method for providing digital contents, comprising the  
step of when meta information about data that is  
transmitted, a meta information schema that defines the  
data structure of the meta information, and contents  
25 data are transmitted through a transmission path,  
changing the structure of the meta information schema  
and the meta information corresponding to data that has

been received from a receiving apparatus and transmitting the changed data.

According to the invention of claim 14, the transmitting apparatus is informed of a meta  
5 information use history, for example, the applied frequency of a meta information schema on the receiving side. Thus, a meta information schema transmitted from the transmitting apparatus is changed. In other words, an attribute whose applied frequency is low is deleted  
10 or the transmission thereof becomes unnecessary. Thus, the data amount of a meta information schema to be transmitted can be reduced.

The invention of claim 15 is a transmitting method for providing digital contents, comprising the  
15 "Step of when meta information about data that is transmitted, a meta information schema that defines the data structure of the meta information, an inference rule about the data structure of the meta information, and contents data are transmitted through a  
20 transmission path, changing the inference rule corresponding to data that has been received from a receiving apparatus and transmitting the changed data.

According to the invention of claim 15, the transmitting apparatus is informed of a meta  
25 information use history, for example, the applied frequency of an inference rule on the receiving side. Thus, an inference rule transmitted from the

transmitting apparatus is changed. In other words, an inference rule whose applied frequency is low is deleted or the transmission thereof becomes unnecessary. Thus, the data amount of an inference rule to be transmitted can be reduced.

The invention of claim 17 is a receiving method for receiving data for providing digital contents, comprising the steps of storing a meta information schema that defines the data structure of meta information, storing meta information that has been selected and received, searching and/or browsing meta information, and changing the structure of the meta information schema and the meta information that has been stored corresponding to a user profile and an inference rule.

According to the invention of claim 17, an inference rule is used. In addition, when the use frequency of the inference rule becomes high or corresponding to a user's setup, the structure of a meta information schema and meta information are changed so that a new attribute is defined corresponding to the inference rule. Thus, the searching efficiency can be improved.

The invention of claim 18 is a transmitting and receiving method for providing digital contents and receiving digital contents, comprising the steps of transmitting meta information about data that is

transmitted, a meta information schema that defines the data structure of the meta information, and contents data through a transmission path, changing the structure of the meta information schema that is transmitted and the meta information corresponding to data that has been received from a receiving apparatus, storing a meta information schema that defines the data structure of the meta information that has been received on a receiving side, storing the meta information that has been selected and received, and searching and/or browsing the meta information.

According to the invention of claim 18, the transmitting apparatus is informed of a meta information use history, for example, the applied frequency of a meta information schema on the receiving side. Thus, a meta information schema transmitted from the transmitting apparatus is changed. In other words, a meta information schema whose applied frequency is low is deleted or the transmission thereof becomes unnecessary. Thus, the data amount of a meta information schema to be transmitted can be reduced.

The invention of claim 19 is a transmitting and receiving method for providing digital contents and receiving digital contents, comprising the steps of transmitting meta information about data that is transmitted, a meta information schema that defines the data structure of the meta information, an inference

rule, and contents data through a transmission path,  
changing the inference rule that is transmitted  
corresponding to data that has been received from a  
receiving apparatus, storing a meta information schema  
5 that defines the data structure of the meta information  
that has been received on a receiving side, storing the  
meta information that has been selected and received,  
and searching and/or browsing the meta information.

According to the invention of claim 19, the  
10 transmitting apparatus is informed of a meta  
information use history, for example, the applied  
frequency of an inference rule on the receiving side.  
Thus, an inference rule transmitted from the  
transmitting apparatus is changed. In other words, an  
15 inference rule whose applied frequency is low is  
deleted or the transmission thereof becomes  
unnecessary. Thus, the data amount of an inference  
rule to be transmitted can be reduced.

The invention of claim 20 is a transmitting  
20 and receiving method for providing digital contents and  
receiving digital contents, comprising the steps of  
transmitting meta information about data that is  
transmitted, a meta information schema that defines the  
data structure of the meta information, an inference  
25 rule about the data structure of the meta information,  
and contents data through a transmission path, storing  
the meta information schema that defines the data



structure of the meta information that has been  
received on a receiving side, storing the meta  
information that has been selected and received, and  
changing the structure of the meta information schema  
and the meta information that has been stored  
corresponding to a user profile and the inference rule.

According to the invention of claim 20, an  
inference rule is used. In addition, when the use  
frequency of the inference rule becomes high or  
corresponding to a user's setup, the structure of a  
meta information schema and meta information are  
changed so that a new attribute is defined  
corresponding to the inference rule. Thus, the  
searching efficiency can be improved.

#### Brief Description of Drawings

Fig. 1 is a block diagram showing a  
communication system according to the present  
invention; Fig. 2 is a block diagram showing an example  
of a broadcasting station according to an embodiment of  
the present invention; Fig. 3 is a block diagram  
showing an example of a receiving terminal apparatus  
according to the embodiment of the present invention;  
Fig. 4 is a schematic diagram for explaining a stream  
according to the embodiment of the present invention;  
Fig. 5 is a schematic diagram showing an example of a  
meta information schema according to the embodiment of  
the present invention; Fig. 6 is a schematic diagram

showing an example of meta information according to the  
embodiment of the present invention; Fig. 7 is a  
schematic diagram showing an example of inference rules  
according to the embodiment of the present invention;  
5 Fig. 8 is a schematic diagram showing an example of a  
meta information operation using inference rules  
according to the embodiment of the present invention;  
Fig. 9 is a schematic diagram showing an example of a  
search input screen according to the embodiment of the  
10 present invention; Fig. 10 is a flow chart for  
explaining a process according to the embodiment of the  
present invention; Fig. 11 is a flow chart for  
explaining a process according to the embodiment of the  
present invention; Fig. 12 is a flow chart for  
15 explaining a process according to the embodiment of the  
present invention; Fig. 13 is a schematic diagram  
showing an example of a meta information changing  
process according to the embodiment of the present  
invention; Fig. 14 is a schematic diagram showing  
20 another example of a meta information schema according  
to the embodiment of the present invention; Fig. 15 is  
a schematic diagram showing another example of meta  
information according to the embodiment of the present  
invention; Fig. 16 is a schematic diagram showing  
25 another example of inference rules according to the  
embodiment of the present invention; Fig. 17 is a  
schematic diagram showing an example of a meta

information schema that has been changed according to the embodiment of the present invention; Fig. 18 is a schematic diagram showing an example of meta information that has been changed according to the embodiment of the present invention; Fig. 19 is a block diagram showing an example of a broadcasting station according to another embodiment of the present invention; Fig. 20 is a block diagram showing an example of a receiving terminal apparatus according to the other embodiment of the present invention; Fig. 21 is a flow chart for explaining a process according to the other embodiment of the present invention; Fig. 22 is a flow chart for explaining a process according to the other embodiment of the present invention; and Fig. 23 is a schematic diagram for explaining an example of a meta information changing process according to the other embodiment of the present invention.

#### Best Modes for Carrying out the Invention

Next, an embodiment of the present invention will be described. Fig. 1 shows an example of the structure of a digital contents delivering system according to the present invention. Information providers 101a and 101b each have a database that stores contents data, a meta information schema that defines the structure of meta information about the contents data, and meta information about each title of the contents data. An example of contents data is a

WWW page. The information providers 101a and 101b are connected to a broadcasting station 102 and receiving terminal apparatuses 103a and 103b through a bidirectional network 105. The information providers 101a and 101b can deliver contents data, a meta information schema, and meta information to the receiving terminal apparatuses 103a and 103b through the bidirectional network 105. Likewise, the broadcasting station 102 has a database that stores contents data, a meta information schema that defines the structure of meta information about the contents data, and meta information of each title of the contents data. An example of the contents data is a program that is broadcast. The broadcasting station 102 is connected to the receiving terminal apparatuses 103a and 103b through a broadcasting network 104. The broadcasting station 102 broadcast contents data, a meta information schema, and meta information to the receiving terminal apparatuses 103a and 103b through the broadcasting network 104. In addition, the broadcasting station 102 can receive contents data, a meta information schema, and meta information from the information providers 101a and 101b through the bidirectional network and then broadcast them to the receiving terminal apparatuses 103a and 103b through the broadcasting network 104.

Fig. 2 shows an example of the structure of

the broadcasting station 102. A data storing portion 204 stores contents data that is broadcast to the receiving terminal apparatuses 103a and 103b. The data storing portion 204 may temporarily store contents data provided by the information providers 101a and 101b. When contents data that is created is delivered without a delay as with a live program, the data storing portion 204 may be a cache that temporarily stores contents data that is monitored.

A meta information schema storing portion 202 stores a meta information schema that defines the structure of meta information about contents data stored in the data storing portion 204. The meta information is information that is added to contents data and broadcast to each receiving terminal apparatus. When contents data is a television program, meta information for example "program title", "program genre", and "parental guide" is added to the contents data. When contents data is a data broadcast, meta information for example "program name", "program genre", and "applicable OS type" is added to the contents data.

A meta information schema defines the structure of meta information added to contents data. There are a plurality of meta information schemas because the structure of meta information added to contents data varies corresponding thereto and time

after time. The plurality of meta information schemas are identified with a meta information schema identifier. In addition, when necessary, a meta information schema, which represents the structure of meta information, may be transmitted to each receiving terminal apparatus through the bidirectional network or the broadcasting network before meta information is transmitted so that the meta information schema can be updated.

A meta information storing portion 203 stores meta information about contents data stored in the data storing portion 204 corresponding to the structure of the meta information schema stored in the meta information schema storing portion 202. For example, as meta information about a particular program, "program title: seven o'clock news", "program genre: news", and "broadcast time: 7:00 to 7:30" are added. An identifier of a meta information schema of the meta information is also added to the contents data.

An inference rule generating and storing portion 201 generates an inference rule corresponding to the structure of a meta information schema. With an inference rule, when meta information is searched and/or browsed, data that is not represented as an attribute value of meta information can be processed. An inference rule converting portion 205 converts the format of a generated inference rule into a

predetermined transmission format. Various types of transmission formats may be used. In this example, the MPEG system session format is used.

5 A meta information schema converting portion  
206 converts the format of a meta information schema  
stored in the meta information schema storing portion  
202 into a predetermined transmission format. The  
descriptive format of a schema stored in the meta  
information schema storing portion 202 may vary for  
10 each title of contents data or each information  
provider. However, the meta information schema  
converting portion 206 converts the format of a meta  
information schema into a predetermined transmission  
format. As the transmission format, various types may  
15 be used. For example, data can be represented in the  
MPEG system section format.

A meta information converting portion 207  
converts the format of meta information stored in the  
meta information storing portion 203 into a  
20 predetermined transmission format. The descriptive  
format of meta information may vary for each title of  
contents data or each information provider. As the  
transmission format, various types may be used. As an  
example, data may be represented in the MPEG system  
25 section format.

A transmitting portion 208 multiplexes an  
inference rule, a meta information schema, meta

information that have been converted in the  
transmission format by the inference rule converting  
portion 205, the meta information schema converting  
portion 206, and the meta information converting  
5 portion 207 with contents data stored in the data  
storing portion 204. The transmitting portion 208  
transmits the multiplexed data to the broadcasting  
network 104. The broadcasting network 104 is for  
example a line corresponding to the MPEG-2 system or  
10 the IP multi-cast.

A communication controlling portion 210 is  
connected to the bidirectional network 105. The  
communication controlling portion 210 receives requests  
for an inference rule, a meta information schema, meta  
15 information, and contents data from the receiving  
terminal apparatuses 103a and 103b. The communication  
controlling portion 210 obtains the inference rule, the  
meta information schema, the meta information, and the  
contents data corresponding to the requests from a  
20 predetermined portion and transmits them to the  
receiving terminal apparatuses 103a and 103b. The  
bidirectional network 105 is for example a line  
corresponding to IP (Internet Protocol), ATM  
(Asynchronous Transfer Mode), or the like. The  
25 structure of each of the information providers 101a and  
101b is the same as the structure of the broadcasting  
station 102 except that the former does not have a



transmitting portion that transmits data to the  
broadcasting network.

Fig. 3 shows an example of the structure of  
each of the receiving terminal apparatuses 103a and  
103b. A receiving portion 301 receives an inference  
rule, a meta information schema, meta information, and  
contents data that are transmitted through the  
broadcasting network 104.

The received inference rule is stored in an  
inference rule storing portion 304. The received meta  
information schema is stored in a meta information  
schema storing portion 307. In addition, the meta  
information schema stored in the meta information  
schema storing portion 307 is occasionally changed by a  
meta information / schema changing portion 308.

The user of each receiving terminal apparatus  
references a meta information schema stored in the meta  
information schema storing portion 307 through a  
profile operating portion 311. A profile input screen  
corresponding to the meta information schema is  
displayed on a displaying portion 313 or another  
displaying portion. The user inputs his or her desired  
profile with the profile operating portion 311. As a  
result, user's profile information is generated. The  
generated profile information is stored in a user  
profile storing portion 312.

The received meta information is supplied to

a meta information filter 303. The meta information filter 303 selects meta information that satisfies conditions of the selected user profile information stored in the user profile storing portion 312. The selected meta information is stored to a meta information storing portion 306. The meta information stored in the meta information storing portion 306 is occasionally changed by the meta information / schema changing portion 308.

A searching operation, a browsing operation, and so forth are performed for meta information stored in the meta information storing portion 306 through a meta information operating portion 310. A meta information input screen for searching meta information and searched meta information are displayed on the displaying portion 313 or another displaying portion. The searched meta information history and/or browsed meta information history is stored in the user profile storing portion 312. The searched meta information history and/or browsed meta information history affects the change processing method of the meta information / schema changing portion 308.

Corresponding to meta information stored in the meta information storing portion 306, contents data corresponding to the meta information is received by the receiving portion 301 and stored to a data storing portion 305. Contents data is displayed on the

displaying portion 313 corresponding to a request that is received from a data operating portion 309. An inference rule, a meta information schema, meta information, and contents data may be requested and received by a communication controlling portion 302 through the bidirectional network 105.

As with the case that a meta information schema and an inference rule are pre-stored in a memory such as a non-volatile memory of a receiving apparatus, when it can be assumed that they are pre-stored in the receiving apparatus, it is not necessary to transmit a meta information schema and an inference rule, but meta information and contents data.

Next, the embodiment of the present invention will be further described. Fig. 4 shows an example of contents data, a meta information schema, meta information, and an inference rule that are delivered by for example a digital broadcast. In Fig. 4, as an example, contents data 401 as a program (a baseball game of Kyojin vs. Hanshin) that chronologically succeeds is shown. An identifier StreamID#1 is assigned to the entire program (hereinafter referred to as baseball game segment) 402. Identifiers StreamID#100 and StreamID#101 are assigned to part of the contents data, for example, the first half and the second half of one inning of the baseball game (hereinafter, one inning is referred to as inning

segment).

In addition to the above-described identifier StreamID, any portion of successive data can be identified with parameters that are data composed of start time and duration (not shown). These time data is defined in an MPEG-2 stream.

Fig. 5 shows a meta information schema that defines a data structure representing a baseball game. In Fig. 5, reference numeral 501 represents the data structure of a baseball game segment as a whole. The baseball segment has attributes that are an attribute "date and time of game" 502, an attribute "team name of home team" 503, and an attribute "team name of visitor team" 504. In Fig. 5, reference numeral 505 represents the data structure of each inning segment of the game. Each inning segment has attributes that are an attribute "information representing game" 506, an attribute "inning number" 507, and an attribute "distinguishment of first half or second half" 508. In at least one service, the data structure defined with the meta information schema shown in Fig. 5 is data common in all the description of a baseball game.

Fig. 6 shows an example of meta information. The meta information is a description of information about a particular baseball game. The description of meta information corresponds to a data structure defined by a meta information schema. In Fig. 6, meta

information 601, 605, and 606 corresponding to the  
baseball game segment 402 (StreamID#1), the inning  
segment 403 (StreamID#100), and the inning segment 404  
(StreamID#101) are shown, respectively. The meta  
5 information 601 is a description of meta information of  
the baseball game segment 402 of "baseball game of  
Kyojin vs. Hanshin on October 10, 1998". Corresponding  
to the data structure of the meta information schema  
501, the attribute "date and time of game" 502, the  
10 attribute "team name of home team" 503, the attribute  
"team name of visitor team" 504, and their attribute  
values 602, 603, and 604 are described.

Likewise, meta information 605 and 606 of the  
inning segment 403 (StreamID#100) and the inning  
15 segment 404 (StreamID#101) are described as shown in  
Fig. 6. In the example shown in Fig. 6, the home team  
is Kyojin, whereas the visitor team is Hanshin.  
StreamID#100 is the first half of the third inning,  
whereas StreamID#101 is the second half of the third  
20 inning.

Fig. 7 shows inference rules. An inference  
rule defines a rule for which an attribute value is  
newly obtained from the relation between segments. In  
Fig. 7, reference numeral 701 is a rule for which an  
25 attribute value of the attribute "date and time of  
game" of the inning segment is obtained. The attribute  
"date and time" of the inning segment defines an

inference rule 701 of which the attribute "date and time" of the inning segment is obtained from the attribute "date and time" of the baseball game segment. Inference rules 702 and 703 define the relation between a particular inning segment and offending teams. When the attribute "distinguishment of first half or second half" of the inning segment is the first half, the inference rule 702 represents that the visitor team is offending. When the attribute "distinguishment of first half or second half" of the inning segment is the second half, the inference rule 703 represents that the home team is offending.

Fig. 8 shows an example of a meta information operation using inference rules. The user searches and/or browses meta information stored in the meta information storing portion 306 through the meta information operating portion 310. Fig. 8 shows the case that the user has input a command 801 for searching and/or browsing (reproducing) an inning segment of which the offending team is Hanshin.

When a scene search menu is selected, as shown in Fig. 9, a user interface screen 901 that shows attributes to be searched is displayed on a part of the displaying portion 313 or another displaying unit under the control of the memory information operating portion 310. When an inning segment of which Hanshin is offending is searched and reproduced, after an "inning"

tab is selected, an attribute "offending" (icon) 903 and an attribute "Hanshin" (icon) 904 are successively selected by moving a cursor 902 and performing a clicking operation. Thereafter, a "SEARCH" button is pressed. In such a manner, a command 801 for searching and/or browsing (reproducing) an inning segment of which the offending team is Hanshin is input.

Since the visitor attribute of meta information is "Hanshin", an inference rule 702 causes an inferring process (pattern matching process) to be performed. This operation is referred to as unification. Thus, it is clear that as denoted by reference numeral 803, the value of variable @s is a baseball game segment represented by StreamID#1. Thus, an inferring process 804 is performed. Corresponding to the attribute "distinguishment of first half or second half" of the meta information 605, variable @inning becomes StreamID#100 as denoted by 805. Thus, it is determined that the result of the user's inquiry is "StreamID#100". The receiving terminal apparatus shown in Fig. 3 reproduces the inning segment 403 (StreamID#100) on the displaying portion 313. In this case, while the displaying portion 313 is reproducing particular contents data, its child screen may display the inning segment 403.

As another example of the searching operation using inference rules, an offending team name of the

inning segment 403 (StreamID#100) may be searched.

Since the attribute "distinguishment of first half or second half" of meta information 605 of the inning

segment 403 is "first half", the unification is

5 performed with the inference rule 702. Thus, it is clear that the value of variable @s is StreamID#1. In addition, as a result of the inferring process, it is clear that the offending team name is "Hanshin".

10 As was described above, an attribute value of meta information that is not explicitly represented can be processed using an inference rule. According to the

embodiment of the present invention, using inference rules, the number of attributes of meta information can be reduced. Thus, the increase of data amount of meta

15 information can be suppressed. As a result, the transmission efficiency can be improved. In other

words, using inference rules, the minimally required amount of meta information is transmitted. The other

20 required meta information is obtained using inference rules by the receiving terminal apparatus. Thus, the transmission efficiency can be improved.

Next, the embodiment of the present invention will be further described. The history of meta

information searched by the meta information operating

25 portion 310 is stored to the user profile storing

portion 312. As a format of which the search history of meta information is stored to the user profile



storing portion 312, an identifier of an inference rule applied in the meta information operation and the frequency thereof are stored as a pair.

Fig. 10 is a flow chart showing a process for storing a search history to the user profile storing portion 312. At step S1, it is determined whether or not a received inference rule has been stored to the inference rule storing portion 304. When the received inference rule has been stored to the inference rule storing portion 304, the flow advances to step S2. At step S2, the frequency  $\text{Freq}(i)$  of the rule applied for the inference rule number  $i$  stored in the user profile storing portion 312 is initialized ( $\text{Freq}(i) = 0$ ). The inference rule number  $i$  is a number assigned to each inference rule.

The meta information operation performed by the user with the meta information operating portion 310, in reality, a meta information searching process, is shown in Fig. 11. At step S11, a meta information operation is performed. Thereafter, the flow advances to step S12. At step S12, it is determined whether or not an inference rule has been applied for a searching process as described with reference to Fig. 8. When an inference rule has not been applied, the flow returns to step S11.

When an inference rule has been applied, the frequency  $\text{Freq}(i)$  applied for the inference rule number

i is incremented by +1 (at step S13). At step S14, it is determined whether or not the applied frequency  $\text{Freq}(i)$  is larger than a threshold value T. The threshold value T is a predetermined value. When the relation of  $(\text{Freq}(i) \leq T)$  is satisfied, the flow returns to step S11. When the relation of  $(\text{Freq}(i) > T)$  is satisfied, the flow advances to step S15. At step S15, a meta information - schema changing process is performed.

Fig. 12 shows the meta information - schema changing process performed by the meta information / schema changing portion 308. At step S21, the user profile storing portion 312 informs the meta information / schema changing portion 308 that  $\text{Freq}(i)$  is larger than the threshold value T. Thus, the meta information / schema changing portion 308 appends the left side of an inference rule of which the applied frequency is larger than the threshold value to the meta information schema. The left side of an inference rule represents an item to be inferred. Thus, the left side of an inference rule is a new attribute of a particular information structure.

In the inference rule 701 shown in Fig. 7, "date and time" of an inning segment is defined as a left side. In the inference rules 702 and 703, offending teams (visitor team and home team) are defined as left sides of the inference rules. At step

S21, the attribute is appended as a new attribute to the meta information schema. As an attribute is appended to the meta information schema, the attribute value of the meta information corresponding to the meta information schema is newly obtained (at step S22).

Next, an example of the meta information - schema changing process will be described with reference to Fig. 13. When it has been determined that the applied frequency Freq(i) of each of the inference rules 702 and 703 is larger than the threshold value T, a new attribute "offending: team name" is appended to the inning structure of the meta information schema (at step S21). Reference numeral 1301 represents the meta information schema to which the attribute has been appended. The meta information schema is stored to the meta information schema storing portion 306.

As a new attribute has been appended to the meta information schema, an attribute of "offending" is also appended to the meta information of the inning segment (StreamID#100) and the attribute value is obtained (at step S22). Reference numeral 1302 represents meta information that has been changed. An attribute of "offending" is also appended to meta information of the inning segment (StreamID#101) and the attribute value is obtained (at step S22). Reference numeral 1303 represents meta information that has been changed. The attribute value of the meta

information is stored to the meta information storing portion 306.

After the changing process has been performed, whenever the searching process is performed, it is not necessary to apply the inference rules 702 and 703. Instead, the values of the attributes of "offending" can be directly obtained from the meta information 1302 and 1303. In the case that the applied frequencies of the inference rules 702 and 703 are high, when the attribute values are stored to the meta information storing portion 306, the searching efficiency can be improved.

In the above-described meta information schema - meta information changing process, the information stored in the meta information schema storing portion 307 and the meta information storing portion 306 is changed corresponding to the search history with the meta information operating portion 310. Alternatively, before information is stored to the meta information schema storing portion 307 and the meta information storing portion 306, the information may be changed.

Figs. 14 to 18 shows another example of the meta information schema - meta information changing process. As was described in the above example, the meta information schema - meta information changing process is not always executed when the applied

frequency of an inference rule is larger than the threshold value. In the other example, a meta information schema and meta information are changed corresponding to a user's setup.

5                    Fig. 14 shows examples of meta information schemas of a news program and a movie. The meta information schema of the news program has attributes that are for example an attribute "program name" and an attribute "announcer name". The meta information  
10                    schema of the news program has attributes that are for example an attribute "title name" and an attribute "actor name". Fig. 15 shows examples of meta information created corresponding to the meta information schemas. In Fig. 15, attribute values of  
15                    the attributes of the news program and the movie are shown.

                    Fig. 16 shows two inference rules 1601 and 1602. The inference rules 1601 and 1602 are inference rules for obtaining attributes "performer". In other  
20                    words, the inference rule 1601 represents that the attribute "announcer" of the news is synonym with an attribute "performer". The inference rule 1602 represents that the attribute "actor" of the movie is synonymous with an attribute "performer".

25                    It may be more preferred for a particular user to treat attributes "announcer" and "actor" as an attribute "performer" rather than distinguishing them.

Thus, the user designates an attribute "performer" as a new attribute through the user profile operating portion 311.

As a result of which the user has designated a new attribute, the meta information schemas shown in Fig. 14 are changed to meta information schemas shown in Fig. 17. The attributes "announcer" and "actor" of the original meta information schemas are changed to the attributes "performer" of the new meta information schemas. The meta information schemas that have been changed are stored to the meta information schema storing portion 307.

In addition, the meta information shown in Fig. 15 is changed to meta information shown in Fig. 18. Although the meta information shown in Fig. 15 is received, when it is stored to the meta information storing portion 306, meta information converted as shown in Fig. 18 is stored. In other words, the attribute values of the attributes "announcer" and "actor" of the original meta information are changed to the attribute values of the attributes "performer".

Next, another embodiment (hereinafter referred to as second embodiment) of the present invention will be described. In the above-described embodiment (hereinafter referred to as first embodiment), the receiving terminal apparatus changes a meta information schema and meta information. On the

other hand, according to the second embodiment of the present invention, with reference to information transmitted from a receiving terminal apparatus, the transmitting side (for example, a broadcasting station) changes a meta information schema and meta information. In the second embodiment, unlike with the first embodiment, a meta information schema and attributes of meta information that are transmitted can be prevented from being different from those of the receiving terminal apparatus.

Fig. 19 shows the structure of a broadcasting station 102 according to the second embodiment of the present invention. For simplicity, in Fig. 19, similar portions to those of the broadcasting station 102 of the first embodiment shown in Fig. 2 are denoted by similar reference numerals and their description is omitted. In the second embodiment, a communication controlling portion 210 receives meta information use histories from receiving terminal apparatuses 103a and 103b through a bidirectional network 105.

Corresponding to the received meta information use histories, a meta information changing portion 211, a meta information schema changing portion 212, and an inference rule changing portion 213 change information stored in a meta information storing portion 203, a meta information schema storing portion 202, and an inference rule generating - storing portion

201, respectively.

Fig. 20 shows the structure of the receiving terminal apparatus 103a (or 103b) according to the second embodiment of the present invention. For simplicity, in Fig. 20, the structural portions similar to those of the receiving terminal apparatus according to the first embodiment (see Fig. 3) are denoted by similar reference numerals and their description is omitted. In the second embodiment, the meta information / schema changing portion is not disposed. The history of the searching and/or browsing operation performed by a meta information operating portion 310 is stored to a user profile storing portion 312. The history of the searching and/or browsing operation is transmitted by a communication controlling portion 302 to a broadcasting station 102 as a transmitting apparatus through a bidirectional network 105.

In the second embodiment, as with the first embodiment, a meta information operation can be performed. For example, as shown in Fig. 5, a meta information schema is described and meta information corresponding thereto is described as shown in Fig. 6. The meta information operating portion 310 searches and/or browses meta information stored in a meta information storing portion 306. When meta information is searched, with inference rules shown in Fig. 7, attribute values of meta information that are not



explicitly represented are obtained as new attribute values as shown in Fig. 8.

Next, the second embodiment of the present invention will be further described. The history of meta information searched by the meta information operating portion 310 is stored to the user profile storing portion 312. As a format of the search history stored to the user profile storing portion 312, an identifier of an inference rule applied for the meta information operation and the frequency thereof are stored as a pair.

Fig. 21 shows a process for storing the search history to the user profile storing portion 312. The process shown in Fig. 21 is the same as the process according to the first embodiment shown in Fig. 10. After a meta information schema and an inference rule (meta information schema number / inference rule number  $i$ ) have been received, it is determined whether or not they have been stored to the meta information schema storing portion 307 and the inference rule storing portion 304, respectively (at step S31). When it has been determined they had been stored, the flow advances to step S32. At step S32, the frequency  $\text{Freq}(i)$  applied for a rule corresponding to the meta information schema number / inference rule number  $i$  stored in the user profile storing portion 312 is initialized ( $\text{Freq}(i) = 0$ ). The meta information schema

number / inference rule number  $i$  is a number assigned to each meta information schema / inference rule.

Fig. 22 shows a process for a meta information operation performed by the user with the meta information operating portion 310, in reality, a meta information searching process. When meta information is searched at step S41, an attribute of meta information having the structure corresponding to a particular meta information schema is searched. When an attribute of meta information has been searched, the applied frequency  $\text{Freq}(i)$  of the meta information schema number  $i$  corresponding to the attribute is incremented by +1 (at steps S42 and S43). When it has been determined that an attribute of meta information had not been referenced, the flow advances to step S44 skipping step S43.

At step S44, it is determined whether or not an inference rule has been applied as described with reference to Fig. 8. When an inference rule has been applied, the applied  $\text{Freq}(i)$  corresponding to the inference rule number  $i$  is incremented by +1 (at step S45). When an inference rule has not been applied, the flow advances to step S46 skipping step S45. At step S46, the meta information schema / inference rule applied frequency  $\text{Freq}(i)$  stored in the user profile storing portion 312 is transmitted as history information to a transmitting apparatus (broadcasting

station). The communication controlling portion 302 transmits the history information periodically or corresponding to a request issued from the transmitting apparatus. When the amount of history information that  
5 has been stored exceeds a predetermined value, the communication controlling portion 302 automatically transmits the history information to the transmitting apparatus.

The transmitted history information is  
10 received by the communication controlling portion 210 of the transmitting apparatus (broadcasting station 120) through the bidirectional network 105. Corresponding to the received history information, a changing process for a meta information schema and an  
15 inference rule is performed. In other words, the meta information schema changing portion 212 deletes attributes whose applied frequencies are low from those of the meta information schema stored in the meta information schema storing portion 202 or prevents them  
20 from being added to transmission data. On the other hand, the meta information changing portion 211 deletes meta information corresponding to attributes that are deleted from those of meta information stored in the meta information storing portion 203 or meta  
25 information corresponding to attributes that are not added to the transmission data or prevents them from being added to the transmission data. As with a meta

information schema, the inference rule changing portion 213 performs a deleting process or a transmission preventing process for inference rules whose applied frequencies are low in those stored in the inference rule generating and storing portion 201. Thus, it is not necessary to transmit unnecessary meta information and inference rules. Consequently, the transmission efficiency can be improved.

In addition, the inference rule changing portion 213 applies inference rules whose applied frequencies are high in those stored in the inference rule generating and storing portion 201 to a meta information schema so as to change the structure of the meta information schema. As the structure of the meta information schema is changed, the meta information is also changed.

Next, the above-described changing process will be further described with reference to Fig. 23. As a result of meta information searched by the user, if the frequency of which the attribute value of the attribute "distinguishment of first half or second half" is searched in those of the meta information schema is low, the attribute "distinguishment of first half or second half" is deleted from the meta information schema. Thus, the attribute "distinguishment of first half or second half" is not added as meta information. Since a meta information

schema and meta information that have been not frequently used are not transmitted, the transmission efficiency can be improved. When the applied frequencies of the inference rules 702 and 703 are high, they are pre-applied. Thus, the attribute "offending" is added to the meta information schema. Instead, the inference rules 702 and 703 are deleted. Thus, the inference rules can be prevented from being unnecessary transmitted.

As a result, the meta information schema is changed to that as denoted by reference numeral 2301 shown in Fig. 23. After the changing process has been performed, meta information is added corresponding to the structure of the meta information schema 2301 that has been changed. For example, the meta information 1302 and 1303 shown in Fig. 13 are transmitted as meta information 2302 and 2303 shown in Fig. 23. In this case, it is not necessary to transmit the inference rules 702 and 703. Since unnecessary meta information and inference rules are not transmitted, when meta information is searched on the receiving side, it is not necessary to apply inference rules. Thus, the searching efficiency can be improved on the receiving side.

According to the second embodiment, the meta information changing portion 211, the meta information schema changing portion 212, and the inference rule

changing portion 213 changes the meta information structure corresponding to the meta information use history received from a receiving terminal apparatus. As changed results of the individual changing portions, the contents stored in the inference rule storing portion 201, the meta information schema storing portion 202, and the meta information storing portion 203 are changed. As another method for performing the changing process, when the inference rule converting portion 205, the meta information schema converting portion 206, and the meta information converting portion 207 convert respective information into the transmission format, the individual information may be affected by the changed results.

When the meta information converting portion 207 has stored meta information in the data format shown in Fig. 15, if a use history that represents that the user has frequently used an attribute "performer" is obtained, as shown in Fig. 18, meta information is changed. The meta information storing portion 203 may be affected by the changed result. However, in this case, the information stored in the meta information storing portion 203 remains unchanged as shown in Fig. 15. Instead, the meta information converting portion 207 converts meta information into that as shown in Fig. 18. When the meta information storing portion 203 is affected by the changed result, the distinguishment

of "announcer" and "actor" is lost. On the other hand,  
when the meta information converting portion 207  
performs the converting process, the original  
information is not lost.

5           In the second embodiment of the present  
invention, the transmission of either meta information  
or inference rules may be omitted.

10           According to the present invention, since a  
transmitting apparatus receives a meta information use  
history from a receiving apparatus of a user and does  
not transmit meta information and inference rules that  
are not necessary for the receiving apparatus of the  
user, the transmission efficiency of meta information  
and inference rules can be improved on the transmitting  
15   apparatus side. On the other hand, since the  
transmitting apparatus transmits only necessary meta  
information and inference rules to the receiving  
apparatus, the searching efficiency of meta information  
can be improved on the receiving apparatus side.

20           According to the present invention, since the  
transmitting apparatus transmits inference rules that  
represent the relation of attributes of meta  
information schemas to each receiving terminal  
apparatus along with meta information schemas, when the  
25   user searches meta information, he or she can search  
more complex results with a small amount of data.

          According to the present invention, using

inference rules, the amount of data transmitted as meta information can be reduced. However, when the user searches meta information, since inference rules are applied, the searching efficiency may be lowered. On the other hand, according to the present invention, the applied frequencies of inference rules are obtained from a search history of the user and inference rules with high applied frequencies are applied to stored meta information. The applied meta information is stored. Thus, the searching efficiency can be improved. In addition, corresponding to a user's setup, the searching efficiency can be improved.



## CLAIMS

1. A transmitting apparatus for providing digital contents, comprising:

meta information storing means for storing  
5 meta information about data that is transmitted;

meta information schema storing means for storing a meta information schema that defines the data structure of meta information about data that is transmitted;

10 inference rule storing means for storing an inference rule about the data structure of meta information about data that is transmitted; and

transmitting means for transmitting the meta information, the meta information schema, the inference  
15 rule, and contents data through a transmission path.

2. A transmitting apparatus for providing digital contents, comprising:

meta information storing means for storing  
meta information about data that is transmitted;

20 meta information schema storing means for storing a meta information schema that defines the data structure of meta information about data that is transmitted;

25 transmitting means for transmitting the meta information, the meta information schema, and contents data through a transmission path;

communication controlling means for

communicating with a receiving apparatus; and

changing means for changing the structure of  
the meta information schema that has been stored in  
said meta information schema storing means and the meta  
5 information that has been stored in said meta  
information storing means corresponding to data that  
has been received through said communication  
controlling means.

3. A transmitting apparatus for providing  
10 digital contents, comprising:

meta information storing means for storing  
meta information about data that is transmitted;

meta information schema storing means for  
storing a meta information schema that defines the data  
15 structure of meta information about data that is  
transmitted;

inference rule storing means for storing an  
inference rule about the data structure of meta  
information about data that is transmitted;

20 transmitting means for transmitting the meta  
information, the inference rule, and contents data  
through a transmission path;

communication controlling means for  
communicating with a receiving apparatus; and

25 changing means for changing the inference  
rule that has been stored in said inference rule  
storing means corresponding to data that has been

received through said communication controlling means.

4. The transmitting apparatus as set forth in claim 1, 2, or 3, further comprising:

5 converting means for converting the format of the meta information into a transmission format.

5. The transmitting apparatus as set forth in claim 2 or 3,

10 wherein data that has been received through said communication controlling apparatus is data that represents a use history of meta information of the receiving apparatus.

6. A receiving apparatus for receiving data for providing digital contents, comprising:

15 receiving means for receiving at least meta information and contents data through a transmission path;

meta information schema storing means for storing a meta information schema;

20 profile operating means for operating a selection criterion for selecting meta information corresponding to the meta information schema;

user profile storing means for storing a user profile generated by said profile operating means;

25 meta information filtering means for selecting and receiving meta information corresponding to the user profile;

meta information storing means for storing

meta information that has been selected and received;

meta information operating means for  
searching and/or browsing meta information;

inference rule storing means for storing an  
5 inference rule about the data structure of meta  
information;

data storing means for receiving and storing  
data of contents represented by the meta information  
that has been selected; and

10 a data operating portion for operating data  
that has been stored in said data storing means.

7. A receiving apparatus for receiving data for  
providing digital contents data, comprising:

receiving means for receiving at least meta  
15 information and contents data through a transmission  
path;

meta information schema storing means for  
storing a meta information schema that defines the data  
structure of meta information;

20 profile operating means for operating a  
selection criterion for selecting meta information  
corresponding to the meta information schema;

user profile storing means for storing a user  
profile generated by said profile operating means;

25 meta information filtering means for  
selecting and receiving meta information corresponding  
to the user profile;

meta information storing means for storing  
meta information that has been selected and received;

meta information operating means for  
searching and/or browsing meta information;

5           inference rule storing means for storing an  
inference rule about the data structure of meta  
information;

10           changing means for changing the structure of  
the meta information schema that has been stored in  
said meta information schema storing means and the meta  
information that has been stored in said meta  
information storing means corresponding to the user  
profile that has been stored in said user profile  
storing means and to the inference rule that has been  
15   stored in said inference rule storing means;

20           data storing means for receiving and storing  
data of contents represented by the selected meta  
information; and

20           a data operating portion for operating data  
that has been stored in said data storing means.

8.           The receiving apparatus as set forth in claim  
7,

25           wherein said changing means changes the meta  
information schema that has been stored in said meta  
information schema storing means and the meta  
information that has been stored in said meta  
information storing means corresponding to a use

history of meta information of a user.

9. The receiving apparatus as set forth in claim  
7,

5 wherein said changing means changes a meta  
information schema and received meta information  
corresponding to a user's setup and stores the changed  
meta information schema and the changed meta  
information to said meta information schema storing  
means and said meta information storing means,  
10 respectively.

10. A transmitting and receiving apparatus having  
a transmitting apparatus for providing digital contents  
and a receiving apparatus for receiving digital  
contents,

15 wherein the transmitting apparatus comprises:  
meta information storing means for storing  
meta information about data that is transmitted;

meta information schema storing means for  
storing a meta information schema that defines the data  
20 structure of meta information about data that is  
transmitted;

inference rule storing means for storing an  
inference rule about the data structure of meta  
information about data that is transmitted; and

25 transmitting means for transmitting the meta  
information, the meta information schema, the inference  
rule, and contents data through a transmission path,

and

wherein the receiving apparatus comprises:

receiving means for receiving the meta  
information, the meta information schema, the inference  
rule, and contents data through a transmission path;

meta information schema storing means for  
storing the received meta information schema;

profile operating means for operating a  
selection criterion for selecting meta information  
corresponding to the meta information schema;

user profile storing means for storing a user  
profile generated by said profile operating means;

meta information filtering means for  
selecting and receiving meta information corresponding  
to the user profile;

meta information storing means for storing  
the meta information that has been selected and  
received;

meta information operating means for  
searching and/or browsing meta information;

inference rule storing means for storing an  
inference rule that has been received;

data storing means for receiving and storing  
data of contents that is represented by the selected  
meta information; and

a data operating portion for operating data  
that has been stored in said data storing means.

11. A transmitting and receiving apparatus having  
a transmitting apparatus for providing digital contents  
and a receiving apparatus for receiving digital  
contents,

5                wherein the transmitting apparatus comprises:  
                 meta information storing means for storing  
meta information about data that is transmitted;

                 meta information schema storing means for  
storing a meta information schema that defines the data  
10                structure of meta information about data that is  
transmitted;

                 transmitting means for transmitting the meta  
information, the meta information schema, and contents  
data through a transmission path;

15                communication controlling means for  
communicating with the receiving apparatus; and

                 changing means for changing the structure of  
the meta information schema that has been stored in  
said meta information storing means and the meta  
20                information that has been stored in said meta  
information storing means corresponding to data that  
has been received through said communication  
controlling means, and

                 wherein the receiving apparatus comprises:

25                receiving means for receiving the meta  
information, the meta information schema, and contents  
data through a transmission path;



meta information schema storing means for  
storing the meta information schema that has been  
received;

5        profile operating means for operating a  
selection criterion for selecting meta information  
corresponding to the meta information schema;

user profile storing means for storing a user  
profile generated by said profile operating means;

10        meta information filtering means for  
selecting and receiving meta information corresponding  
to the user profile;

meta information storing means for storing  
meta information that has been selected and received;

15        meta information operating means for  
searching and/or browsing meta information;

data storing means for receiving and storing  
data of contents represented by the meta information  
that has been selected;

20        a data operating portion for operating data  
that has been stored in said data storing means; and

communication controlling means for  
transmitting data to the transmitting apparatus.

12.        A transmitting and receiving apparatus having  
a transmitting apparatus for providing digital contents  
25        and a receiving apparatus for receiving digital  
contents,

wherein the transmitting apparatus comprises:

meta information storing means for storing  
meta information about data that is transmitted;

meta information storing means for storing a  
meta information schema that defines the data structure  
of meta information about data that is transmitted;

inference rule storing means for storing an  
inference rule about the data structure of meta  
information about data that is transmitted;

transmitting means for transmitting the meta  
information, the meta information schema, the inference  
rule, and contents data through a transmission path;

communication controlling means for  
communicating with the receiving apparatus; and

changing means for changing the inference  
rule that has been stored in said inference rule  
storing means corresponding to data that has been  
received through said communication controlling means,  
and

wherein the receiving apparatus comprises:

receiving means for receiving the meta  
information, the meta information schema, the inference  
rule, and contents data through a transmission path;

meta information schema storing means for  
storing the meta information schema that has been  
received;

profile operating means for operating a  
selection criterion for selecting meta information

corresponding to the meta information schema;

user profile storing means for storing a user profile generated by said profile operating means;

meta information filtering means for  
5 selecting and receiving meta information corresponding to the user profile;

meta information storing means for storing the meta information that has been selected and received;

10 meta information operating means for searching and/or browsing meta information;

inference rule storing means for storing the inference rule that has been received;

data storing means for receiving and storing  
15 data of contents represented by the meta information that has been selected;

a data operating portion for operating data that has been stored in said data storing means; and

communication controlling means for  
20 transmitting data to the transmitting apparatus.

13. A transmitting and receiving apparatus having a transmitting apparatus for providing digital contents and a receiving apparatus for receiving digital contents,

25 wherein the transmitting apparatus comprises:  
meta information storing means for storing meta information about data that is transmitted;

meta information schema storing means for storing a meta information schema that defines the data structure of meta information about data that is transmitted;

5           inference rule storing means for storing an inference rule about the data structure of meta information about data that is transmitted; and

          transmitting means for transmitting the meta information, the meta information schema, the inference rule, and contents data through a transmission path, and

10

          wherein the receiving apparatus comprises:

          receiving means for receiving the meta information, the meta information schema, the inference rule, and contents data through a transmission path;

15

          meta information schema storing means for storing the meta information schema that has been received;

          profile operating means for operating a selection criterion for selecting meta information corresponding to the meta information schema;

20

          user profile storing means for storing a user profile generated by said profile operating means;

          meta information filtering means for selecting and receiving meta information corresponding to the user profile;

25

          meta information storing means for storing

the meta information that has been selected and received;

meta information operating means for searching and/or browsing meta information;

5 inference rule storing means for storing an inference rule;

changing means for changing the structure of the meta information schema that has been stored in said meta information schema storing means and the meta information that has been stored in said meta information storing means corresponding to the user profile that has been stored in said user profile storing means and to the inference rule that has been stored in said inference rule storing means;

15 data storing means for receiving and storing data of contents represented by the meta information that has been selected; and

a data operating portion for operating data stored in said data storing means.

20 14. A transmitting method for providing digital contents, comprising the step of:

when meta information about data that is transmitted, a meta information schema that defines the data structure of the meta information, and contents data are transmitted through a transmission path, changing the structure of the meta information schema and the meta information corresponding to data that has

been received from a receiving apparatus and transmitting the changed data.

15. A transmitting method for providing digital contents, comprising the step of:

5                   when meta information about data that is transmitted, a meta information schema that defines the data structure of the meta information, an inference rule about the data structure of the meta information, and contents data are transmitted through a  
10                   transmission path, changing the inference rule corresponding to data that has been received from a receiving apparatus and transmitting the changed data.

16. The transmitting method as set forth in claim 14 or 15, further comprising the step of:

15                   receiving a meta information use history from the receiving apparatus and transmitting a meta information schema, meta information, and an inference rule that have been changed so that they have respective data structures corresponding to the meta  
20                   information use history.

17. A receiving method for receiving data for providing digital contents, comprising the steps of:

                  storing a meta information schema that defines the data structure of meta information;

25                   storing meta information that has been selected and received;

                  searching and/or browsing meta information;

and

changing the structure of the meta  
information schema and the meta information that has  
been stored corresponding to a user profile and an  
inference rule.

18. A transmitting and receiving method for  
providing digital contents and receiving digital  
contents, comprising the steps of:

transmitting meta information about data that  
is transmitted, a meta information schema that defines  
the data structure of the meta information, and  
contents data through a transmission path;

changing the structure of the meta  
information schema that is transmitted and the meta  
information corresponding to data that has been  
received from a receiving apparatus;

storing a meta information schema that  
defines the data structure of the meta information that  
has been received on a receiving side;

storing the meta information that has been  
selected and received; and

searching and/or browsing the meta  
information.

19. A transmitting and receiving method for  
providing digital contents and receiving digital  
contents, comprising the steps of:

transmitting meta information about data that

is transmitted, a meta information schema that defines the data structure of the meta information, an inference rule, and contents data through a transmission path;

5           changing the inference rule that is transmitted corresponding to data that has been received from a receiving apparatus;

          storing a meta information schema that defines the data structure of the meta information that  
10       has been received on a receiving side;

          storing the meta information that has been selected and received; and

          searching and/or browsing the meta information.

15       20.       A transmitting and receiving method for providing digital contents and receiving digital contents, comprising the steps of:

          transmitting meta information about data that is transmitted, a meta information schema that defines  
20       the data structure of the meta information, an inference rule about the data structure of the meta information, and contents data through a transmission path;

          storing the meta information schema that defines the data structure of the meta information that  
25       has been received on a receiving side;

          storing the meta information that has been



selected and received; and

changing the structure of the meta  
information schema and the meta information that has  
been stored corresponding to a user profile and the  
inference rule.

5

## ABSTRACT

Along with contents data, a meta information schema, meta information, and inference rules are individually received and stored. A meta information operating portion 310 searches or browses meta information stored in a meta information storing portion 307. The searched and/or browsed history is stored to a user profile storing portion 312. With inference rules, attributes that are not explicitly represented in meta information can be used. When an inference rule whose applied frequency is larger than a predetermined threshold value, a meta information / schema changing portion 308 changes a meta information schema and meta information so that they have an attribute obtained by the inference rule corresponding to the searched and/or browsed history. Thus, since inference rules are not always applied, the searching efficiency can be improved.

Fig. 1

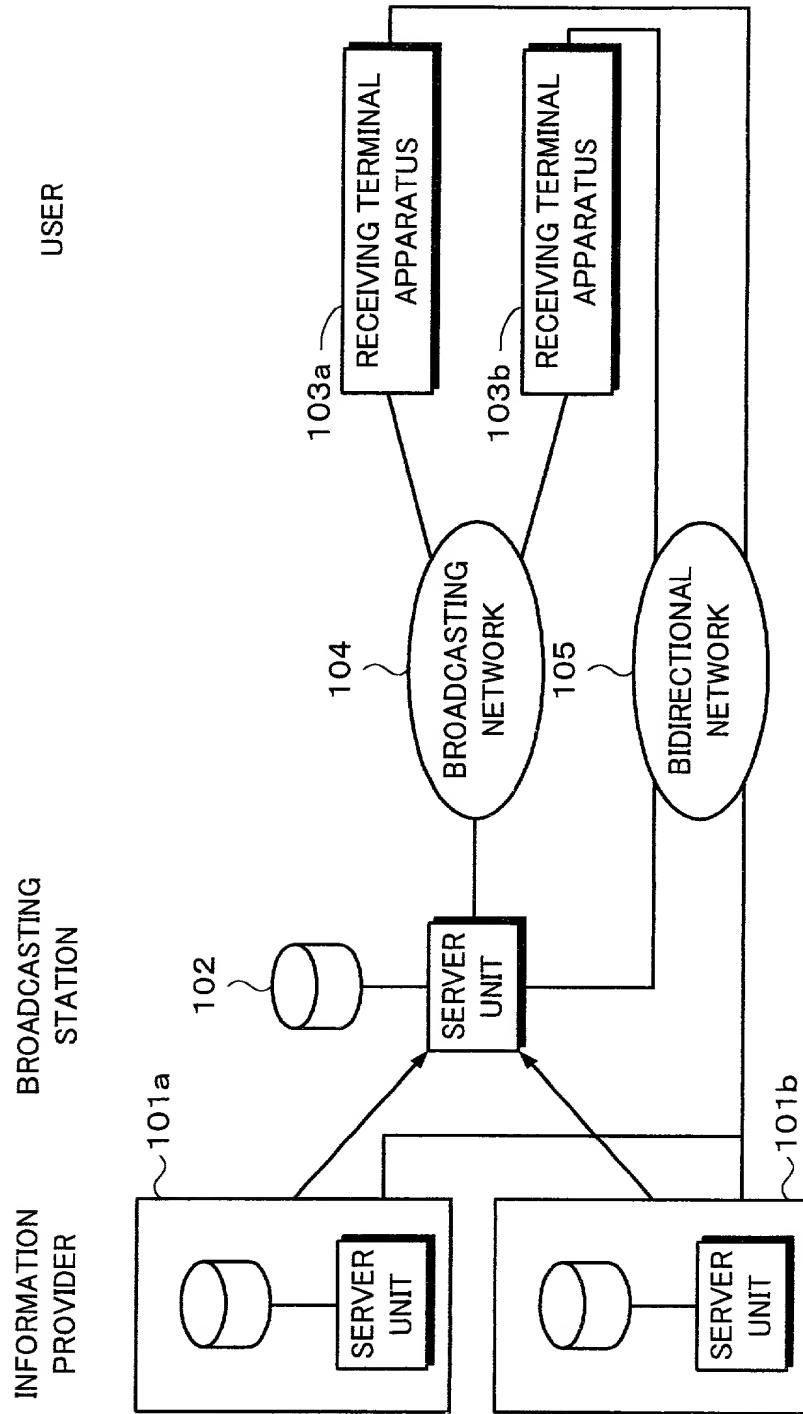




Fig. 3

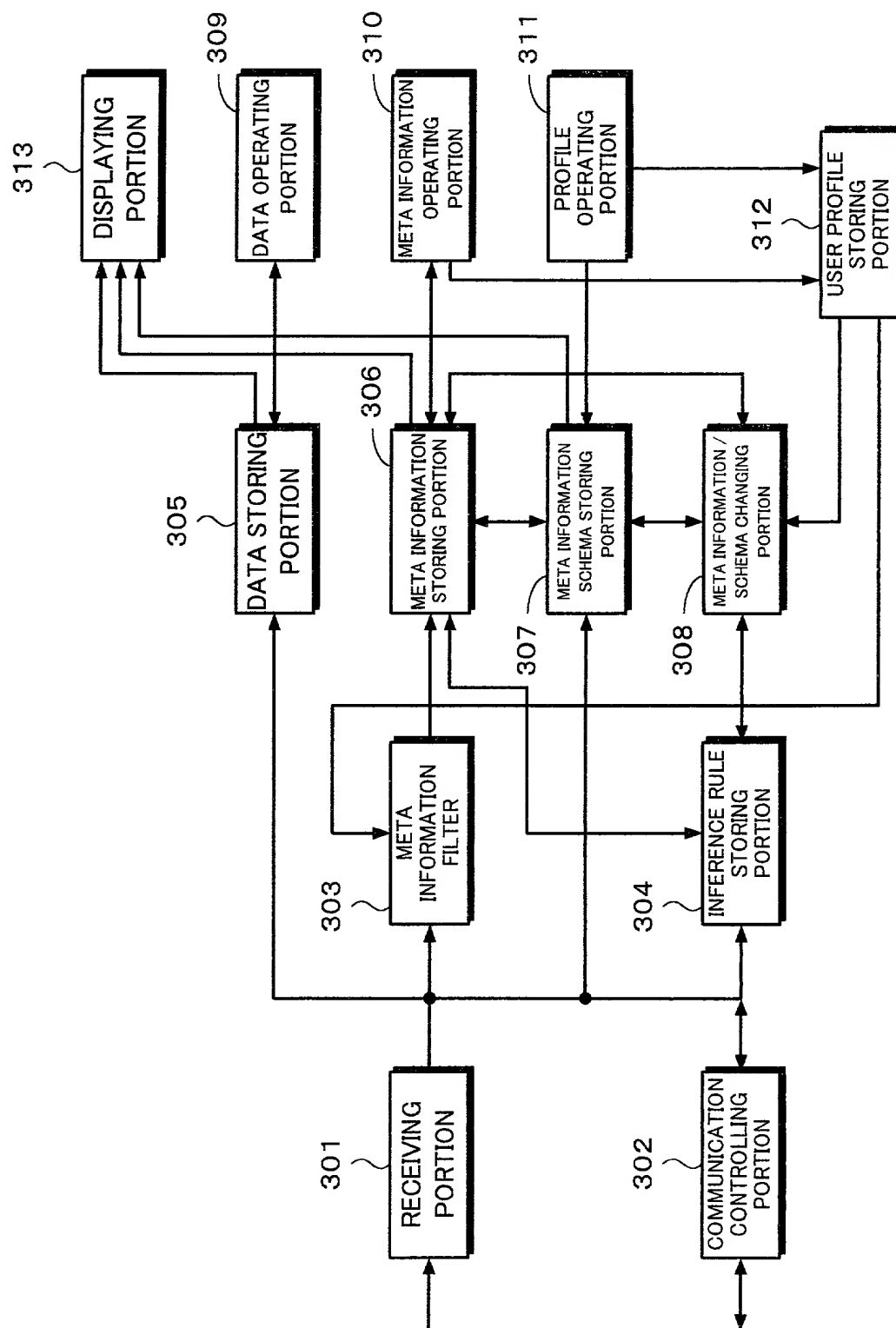
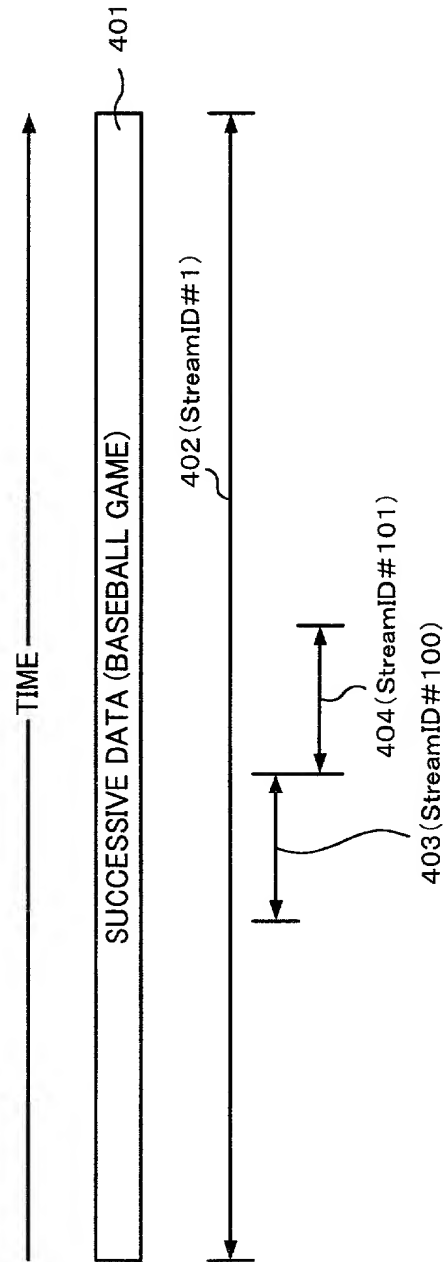


Fig. 4



**Fig. 5**

```

BaseballGame {
    date and time: [date]      ~ 502
    home:          [team name] ~ 503
    visitor:       [team name] ~ 504
}
Inning {
    game:          [BaseballGame] ~ 506
    inning:        [N]             ~ 507
    first half / second half: [first half or second half] ~ 508
}

```

501  
505

**Fig. 6**

```

<BaseballGame about="StreamID#1">
    <date and time> 1998/10/10 </date and time> ~ 602
    <home> Kyojin </home> ~ 603
    <visitor> Hanshin </visitor> ~ 604
</BaseballGame>
<Inning ID="StreamID#100">
    <game resource="StreamID#1"/>
    <inning> 3 </inning>
    <first half or second half> first half </first half or second half>
</Inning>
<Inning ID="StreamID#101">
    <game resource="StreamID#1"/>
    <inning> 3 </inning>
    <first half or second half> second half </first half or second half>
</Inning>

```

601  
605  
606

Fig. 7

time and date (@inning, @date) : -  
game (@inning, @s), time and date (@s, @date) ] 701  
offending (@inning, @team) : -  
game (@inning, @s), visitor (@s, @team), first half or second half (@inning, "first half"). ] 702  
offending (@inning, @team) : -  
game (@inning, @s), home (@s, @team), first half or second half (@inning, "second half"). ] 703



## Fig. 8

offending (@inning, "Hanshin") : - ? ~ 801  
 game (@inning, @s), visitor (@s, "hanshin"), first half or second half (@inning, "first half") ~ 802  
 @s = "StreamID#1" ~ 803  
 game (@inning, @s), visitor ("StreamID#1", "Hanshin"), first half or second half (@inning, "first half") ~ 804  
 @inning = "StreamID#100" ~ 805

**Fig. 9**

**SCENE SEARCH**

inning Batter

INNING :

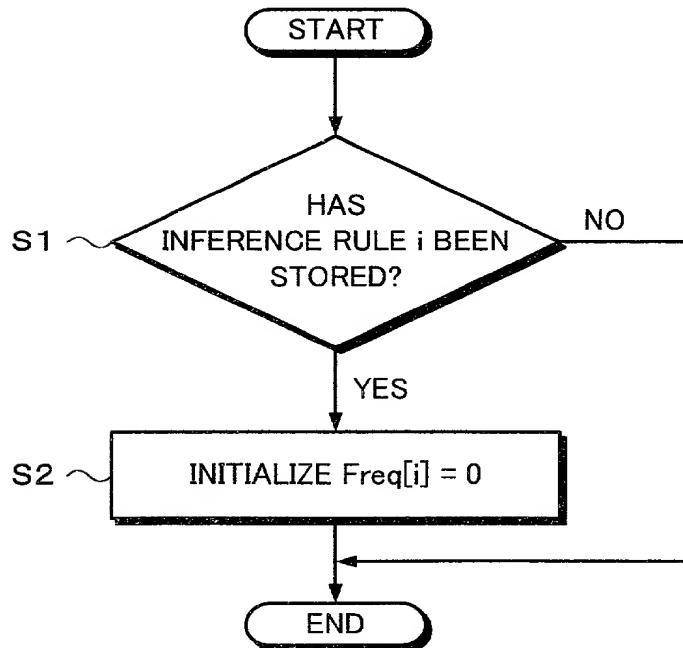
FIRST HALF OR SECOND HALF : (NOT SELECTED)

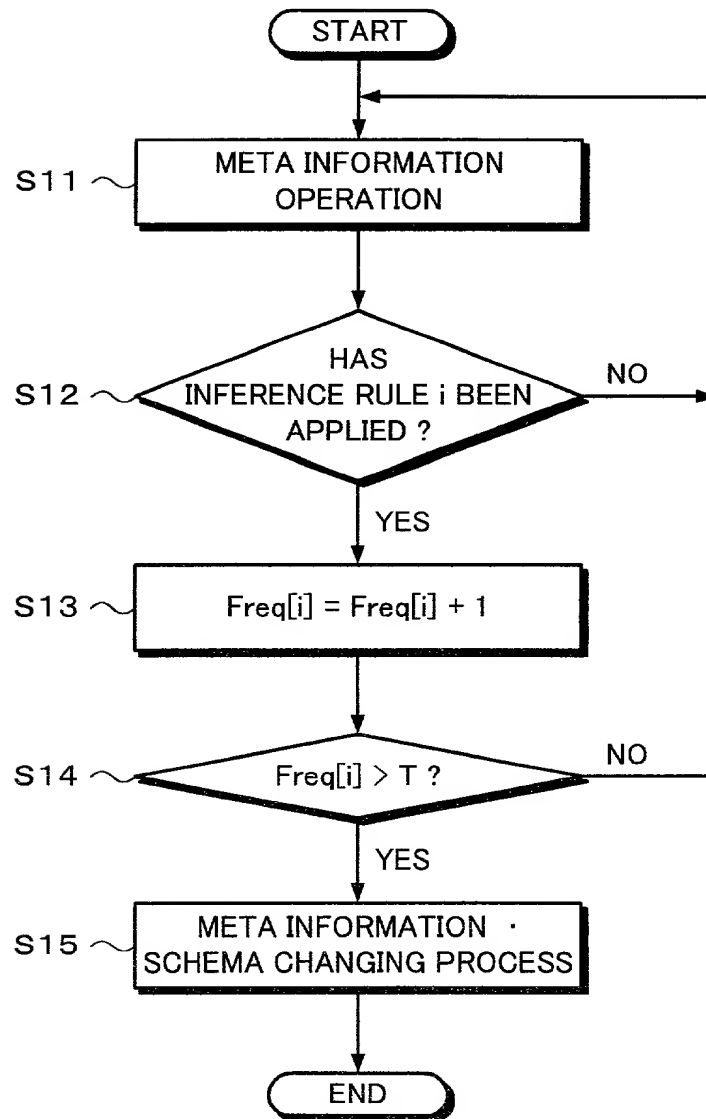
903 OFFENDING : KYOJIN  
HANSHIN

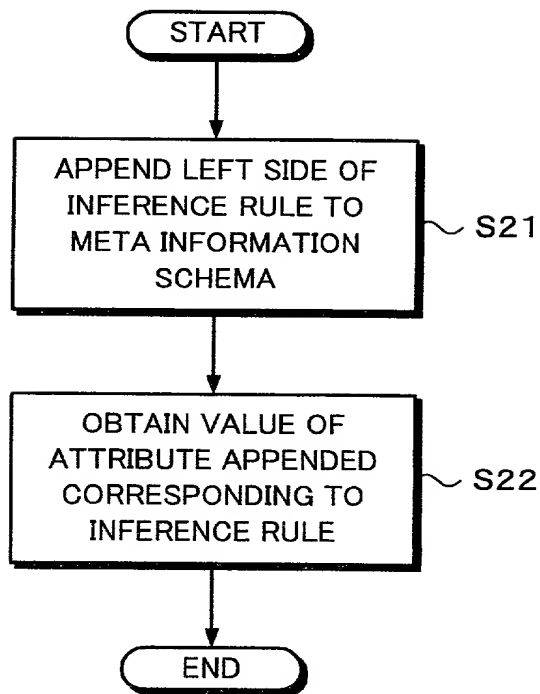
901

SEARCH

904 902 905

**Fig. 10**

**Fig. 11**

**Fig. 12**

**Fig. 13**

[inference rules]

offending (@inning, @team) : -

game (@inning, @s), visitor (@s, @team), first half or second half (@inning, "first half") ~ 702

offending (@inning, @team) : -

game (@inning, @s), home (@s, @team), first half or second half (@inning, "second half") ~ 703

[meta information schema]

|                                |   |      |                             |
|--------------------------------|---|------|-----------------------------|
| Inning {                       | } | 1301 |                             |
| game :                         |   |      | [BaseballGame]              |
| inning :                       |   |      | [N]                         |
| first half or<br>second half : |   |      | [first half or second half] |
| offending :                    |   |      | [team name]                 |
| }                              |   |      |                             |

[meta information ]

|   |   |      |
|---|---|------|
| <Inning ID = "StreamID#100">  | } | 1302 |
| <game resource = "StreamID#100"/>                                   |   |      |
| <inning> 3 </inning>  |   |      |
| <first half or second half> first half </first half or second half> |   |      |
| <offending> Hanshin </offending>                                    |   |      |
| </Inning>   |   |      |

|  |   |      |
|--|---|------|
| <Inning ID = "StreamID#101">   | } | 1303 |
| <game resource = "StreamID#100"/>                                    |   |      |
| <inning> 3 </inning>   |   |      |
| <first half or second half> second half </first half or second half> |   |      |
| <offending> Kyojin </offending>                                      |   |      |
| </Inning>  |   |      |

**Fig. 14**

```

News {
    program name :    [text]
    announcer :      [name]
    . . .
}
Movie {
    title :           [text]
    actor :           [name]
    . . .
}

```

**Fig. 15**

```

<News about = "ID#1">
    <program name> Seven o'clock news </program name>
    <announcer> Tokkyo Hanako </announcer>
    . . .
</News>

<Movie about = "ID#100">
    <title> Some Movie </title>
    <actor> Tokkyo Taro </actor>
</Movie>

```

**Fig. 16**

```

performer (@news, @person) : -
    announcer (@news, @person). ~ 1601
performer (@movie, @person) : -
    actor (@movie, @person). ~ 1602

```

**Fig. 17**

```

News {
    program name :    [text]
    performer :      [name]
    . . .
}

Movie {
    title :          [text]
    performer :      [name]
    . . .
}

```

**Fig. 18**

```

<News about = "ID#1">
    <program name> seven o'clock news </program name>
    <performer> Tokkyo Hanako </performer>
    . . .
</News>
<Movie about = "ID#100">
    <title> Some Movie </title>
    <performer> Tokkyo Taro </performer>
</Movie>

```

Fig. 19

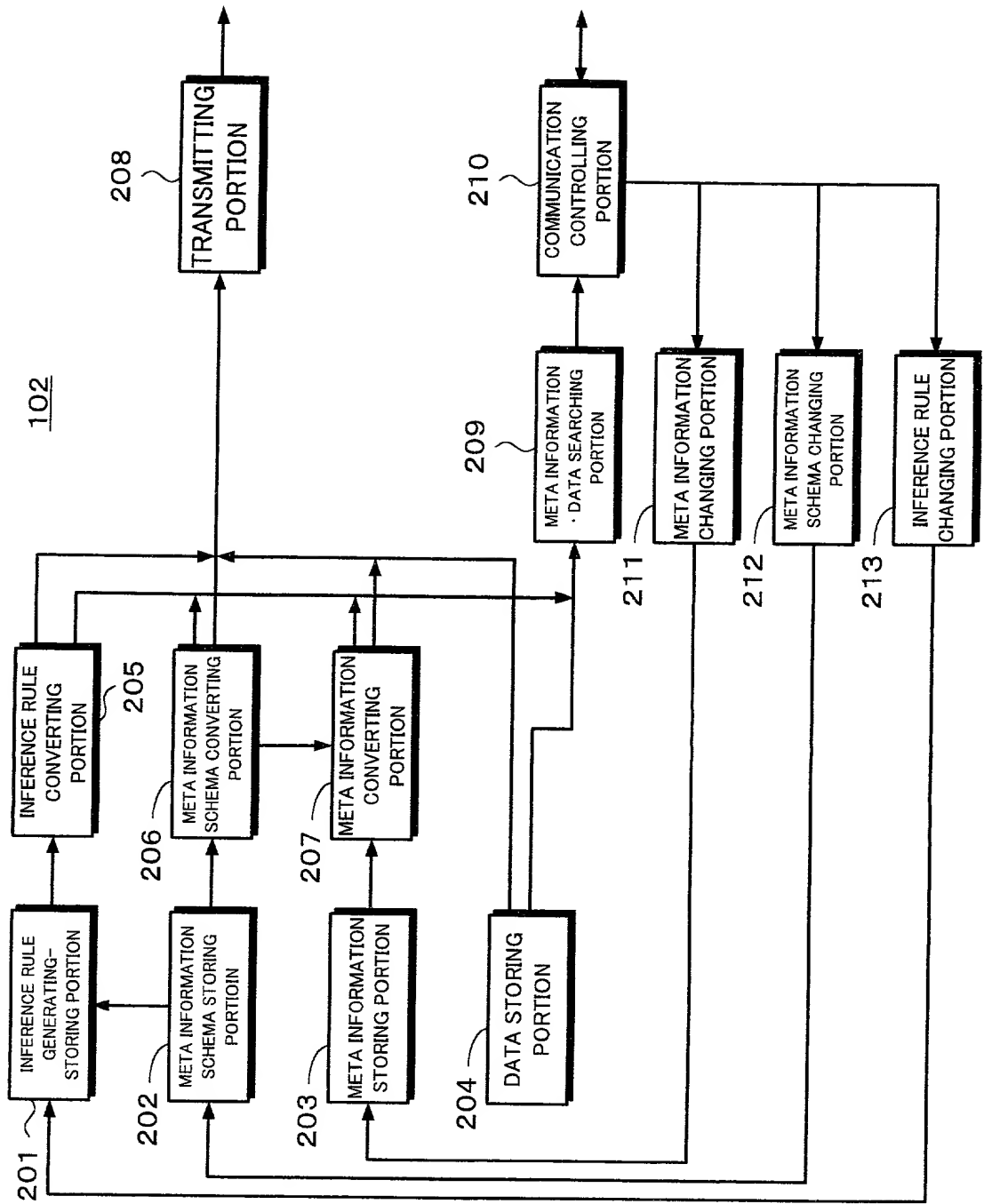
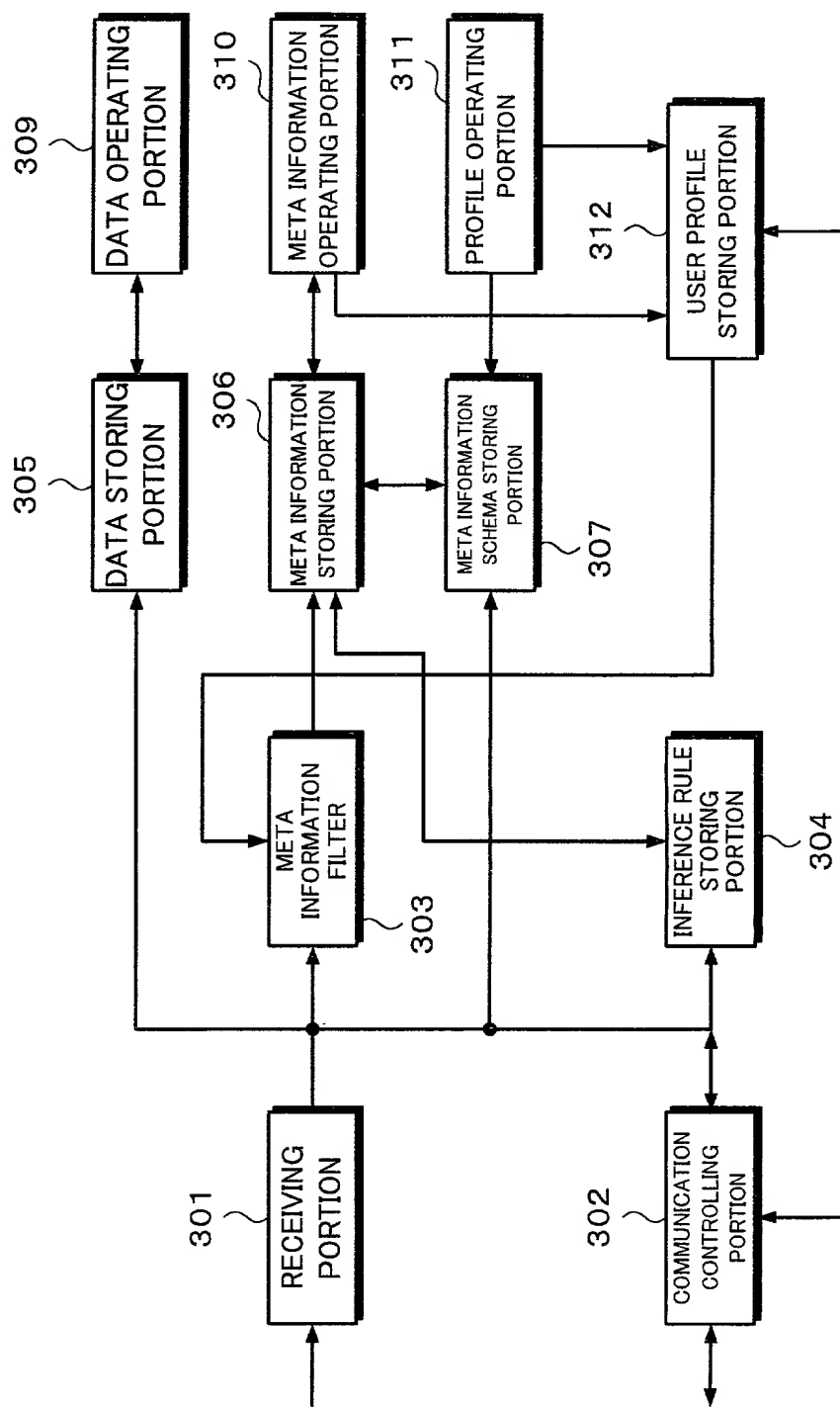
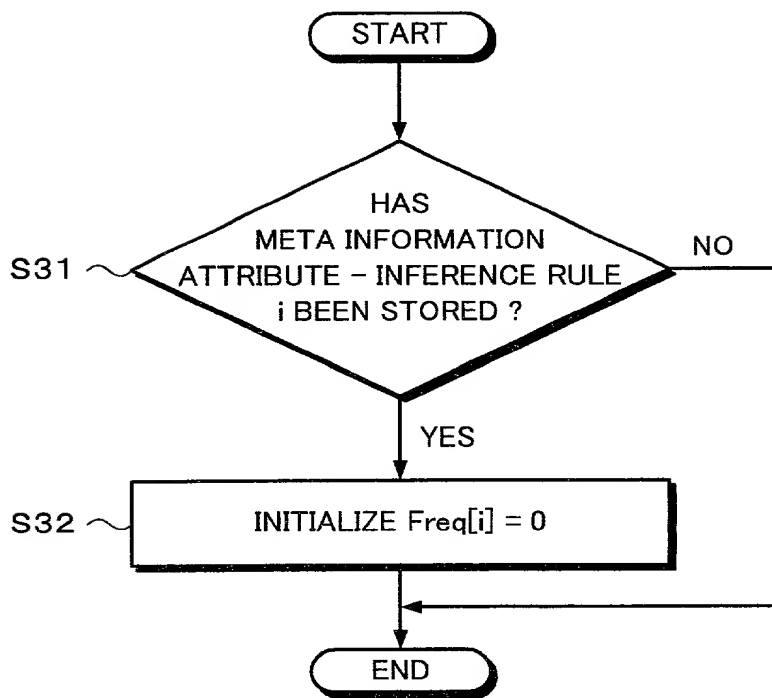


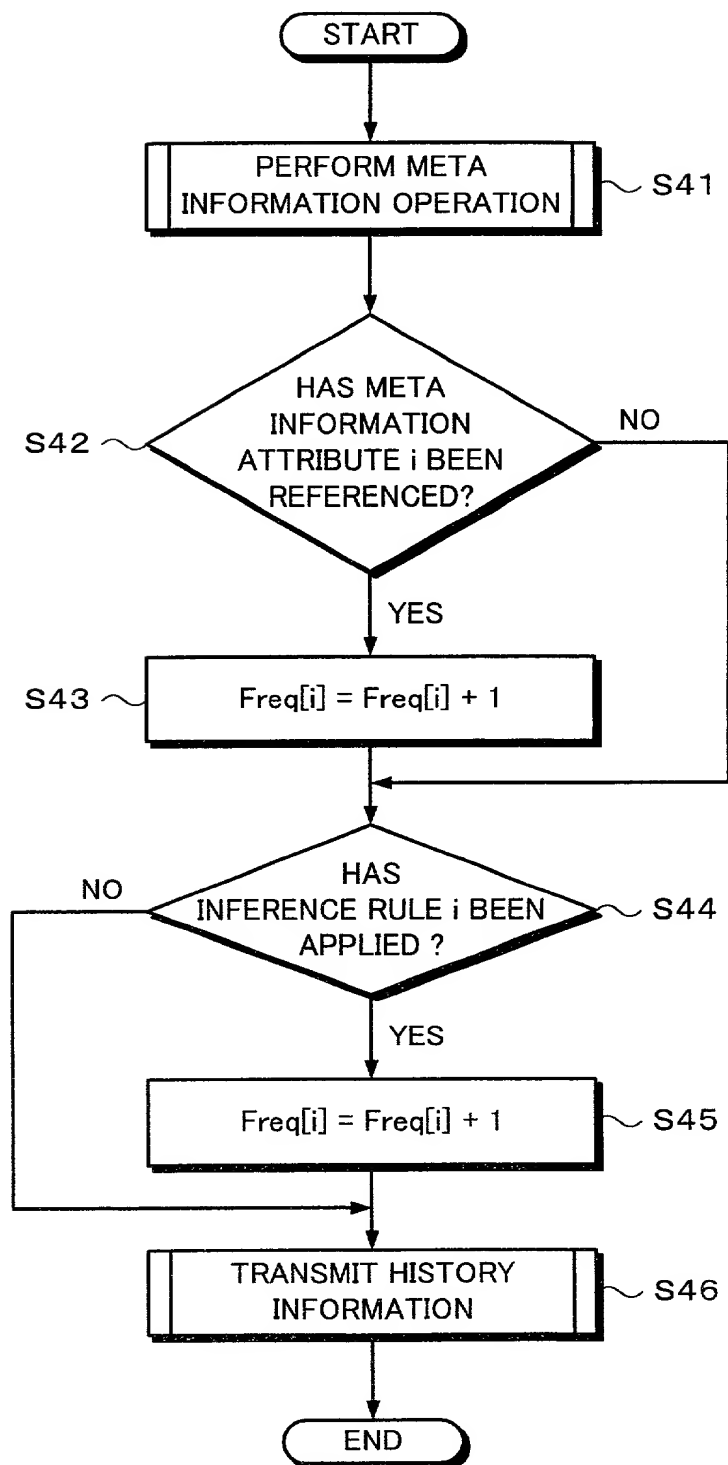


Fig. 20



**Fig. 21**

**Fig. 22**



**Fig. 23**

[inference rule]

offending (@inning, @team) : -

game (@inning, @s), visitor (@s, @team), first half or second half (@inning, "first half")  $\sim$  702

offending (@inning, @team) : -

game (@inning, @s), home (@s, @team), first half or second half (@inning, "second half")  $\sim$  703

[meta information schema]

|             |                |      |
|-------------|----------------|------|
| Inning {    |                |      |
| game :      | [BaseballGame] |      |
| inning :    | [N]            | 2301 |
| offending : | [team name]    |      |
| }           |                |      |

[meta information]

|                                   |      |
|-----------------------------------|------|
| <Inning ID = "StreamID#100">      |      |
| <game resource = "StreamID#100"/> |      |
| <inning> 3 </inning>              |      |
| <offending> Hanshin </offending>  | 2302 |
| </Inning>                         |      |

|                                   |      |
|-----------------------------------|------|
| <Inning ID = "StreamID#101">      |      |
| <game resource = "StreamID#100"/> |      |
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201 INFERENCE RULE GENERATING - STORING PORTION  
202 META INFORMATION SCHEMA STORING PORTION  
203 META INFORMATION STORING PORTION  
204 DATA STORING PORTION  
210 COMMUNICATION CONTROLLING PORTION  
211 META INFORMATION CHANGING PORTION  
212 META INFORMATION SCHEMA CHANGING PORTION  
213 INFERENCE RULE CHANGING PORTION  
302 COMMUNICATION CONTROLLING PORTION  
308 META INFORMATION / SCHEMA CHANGING PORTION  
310 META INFORMATION OPERATING PORTION  
312 USER PROFILE STORING PORTION

**Declaration and Power of Attorney for Patent Application****特許出願宣言書及び委任状****Japanese Language Declaration****日本語宣言書**

私は、以下に記名された発明者として、ここに下記の通り宣言する：

As a below named inventor, I hereby declare that:

私の住所、郵便の宛先そして国籍は、私の氏名の後に記載された通りである。

My residence, post office address and citizenship are as stated next to my name:

下記の名称の発明について、特許請求範囲に記載され、且つ特許が求められている発明主題に関して、私は、最初、最先且つ唯一の発明者である（唯一の氏名が記載されている場合）か、或いは最初、最先且つ共同発明者である（複数の氏名が記載されている場合）と信じている。

I believe I am the original, first and sole inventor if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled.

TRANSMITTING APPARATUS, RECEIVING  
APPARATUS, TRANSMITTING AND RECEIVING  
APPARATUS, TRANSMITTING METHOD, RECEIVING  
METHOD, AND TRANSMITTING AND RECEIVING  
METHOD

上記発明の明細書はここに添付されているが、下記の額がチェックされている場合は、この限りでない：

the specification of which is attached hereto unless the following box is checked:

☐ \_\_\_\_\_ の日に出願され、  
この出願の米国出願番号または PCT 国際出願番号は、  
\_\_\_\_\_ であり、且つ  
\_\_\_\_\_ の日に補正された出願（該当する場合）

☒ was filed on March 15, 2000  
as United States Application Number of  
PCT International Application Number PCT/JP00/01560  
\_\_\_\_\_ and was amended on  
\_\_\_\_\_ (if applicable).

私は、上記の補正書によって補正された、特許請求範囲を含む上記明細書を検討し、且つ内容を理解していることをここに表明する。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第 37 編規則 1.56 に定義されている、特許性について重要な情報を開示する義務があることを認める。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the need of the individual case. Any comments on the amount of time you are required to complete this form should be sent to Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner of Patents and Trademarks, Washington, DC 20231.

## 日本語宣言書

私は、ここに、以下に記載した外国での特許出願または発明者証の出願、或いは米国以外の少なくとも一国を指定している米国法典第35編第365条(a)によるPCT国際出願について、同第119条(a)(d)項又は第365条(b)項に基づいて優先権を主張するとともに、優先権を主張する本出願の出願日より前の出願日を有する外国での特許出願または発明者証の出願、或いはPCT国際出願については、いかなる出願も、下記の枠内をチェックすることにより示した。

I hereby claim foreign priority under Title 35, United States Code, Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT international application having a filing date before that of the application for which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

外国での先行出願

優先権主張なし

075870/1999

Japan

(Number)

(Country)

(番号)

(国名)

19 March 1999

(Day/Month/Year Filed)

☐

PCT/JP00/01560

PCT

(Number)

(Country)

(番号)

(国名)

15 March 2000

(Day/Month/Year Filed)

☐

(Number)

(Country)

(番号)

(国名)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(番号)

(国名)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(番号)

(国名)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(番号)

(国名)

(Day/Month/Year Filed)

☐

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.)

(Filing Date)

(出願番号)

(出願日)

(Application No.)

(Filing Date)

(出願番号)

(出願日)

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of application.

(Status: Patented, Pending, Abandoned)

(現況: 特許許可、係属中、放棄)

(Application No.)

(Filing Date)

(出願番号)

(出願日)

私は、ここに表明された私自身の知識に係わる陳述が真実であり、且つ情報と信ずることに基づく陳述が、真実であると信じられることを宣言し、さらに、故意に虚偽の陳述などを行った場合は、米国法典第18編第1001条に基づき、罰金または拘禁、若しくはその両方により処罰され、またそのような故意による虚偽の陳述は、本出願またはそれに対して発行されるいかなる特許も、その有効性に問題が生ずることを理解した上で陳述が行われたことを、ここに宣言する。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## 日本語宣言書

委任状： 私は本出願を審査する手続を行い、且つ米国特許商標庁との全ての業務を遂行するために、記名された発明者として、下記の弁護士及び／または弁理士を任命する。（氏名及び整理番号を記載すること）

書類送付先

直通電話連絡先：（氏名及び電話番号）

唯一または第一発明者氏名

発明者の署名

日付

住所

国籍

郵便の宛先

第二共同発明者がいる場合、その氏名

第二共同発明者の署名

日付

住所

国籍

郵便の宛先

（第三以下の共同発明者についても同様に記載し、署名をすること）

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact al business in the Patent and Trademark Office connected therewith (list name and registration number)

WILLIAM S. FROMMER, Registration No. 25,506 and  
DENNIS M. SMID, Registration No. 34,930

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c/o FROMMER LAWRENCE & HAUG LLP  
745 Fifth Avenue  
New York, New York 10151

Direct Telephone Calls to: (212) 588-0800

To the attention of: **WILLIAM S. FROMMER**

Full name of sole or first inventor

Fumihiko NISHIO

Inventor's signature

Date

Residence

TOKYO

Citizenship

Japan

Post Office Address:

Sony Corporation  
7-35 Kitashinagawa 6-Chome  
Shinagawa-Ku, Tokyo 141, Japan

full name of second joint inventor, if any

Yoshihisa GONNO

Second Inventor's signature

Date

Residence

KANAGAWA

Citizenship

Japan

Post Office Address

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Shinagawa-Ku, Tokyo 141, Japan

(Supply similar information and signature for third and subsequent joint inventors)



## 日本語宣言書

委任状： 私は本出願を審査する手続を行い、且つ米国特許商標庁との全ての業務を遂行するために、記名された発明者として、下記の弁護士及び／または弁理士を任命する。（氏名及び整理番号を記載すること）

書類送付先

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745 Fifth Avenue  
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Direct Telephone Calls to: (212) 588-0800  
To the attention of: **WILLIAM S. FROMMER**

第三共同発明者がいる場合、その氏名

第三共同発明者の署名

日付

住所

国籍

郵便の宛先

第四共同発明者がいる場合、その氏名

第四共同発明者の署名

日付

住所

国籍

郵便の宛先

（第五以下の共同発明者についても同様に記載し、署名をすること）

Full name of third joint inventor, if any

3-w Kazuo HARAOKA

Third inventor's signature

Date

Kazuo Haraoka

30th Jun / 2001

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Citizenship

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Full name of fourth joint inventor, if any

4-w Yasuaki YAMAGISHI

Fourth Inventor's signature

Date

Yasuaki Yamagishi

January 25, 2001

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(Supply similar information and signature for fifth and subsequent joint inventors)

## 日本語宣言書

委任状： 私は本出願を審査する手続を行い、且つ米国特許商標庁との全ての業務を遂行するために、記名された発明者として、下記の弁護士及び/または弁理士を任命する。(氏名及び整理番号を記載すること)

書類送付先

直通電話連絡先：(氏名及び電話番号)

第五共同発明者がいる場合、その氏名

第五共同発明者の署名

日付

住所

国籍

郵便の宛先

第六共同発明者がいる場合、その氏名

第六共同発明者の署名

日付

住所

国籍

郵便の宛先

(第七以下の共同発明者についても同様に記載し、署名をすること)

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number)

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Full name of fifth joint inventor, if any

Kazuhiko TAKABAYASHI

Fifth inventor's signature

Date

Kazuhiko Takabayashi

January 29, 2001

Residence

TOKYO

Citizenship

Japan

Post Office Address:

Sony Corporation  
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Full name of sixth joint inventor, if any

Sixth Inventor's signature

Date

Residence

Citizenship

Post Office Address:

(Supply similar information and signature for seventh and subsequent joint inventors)